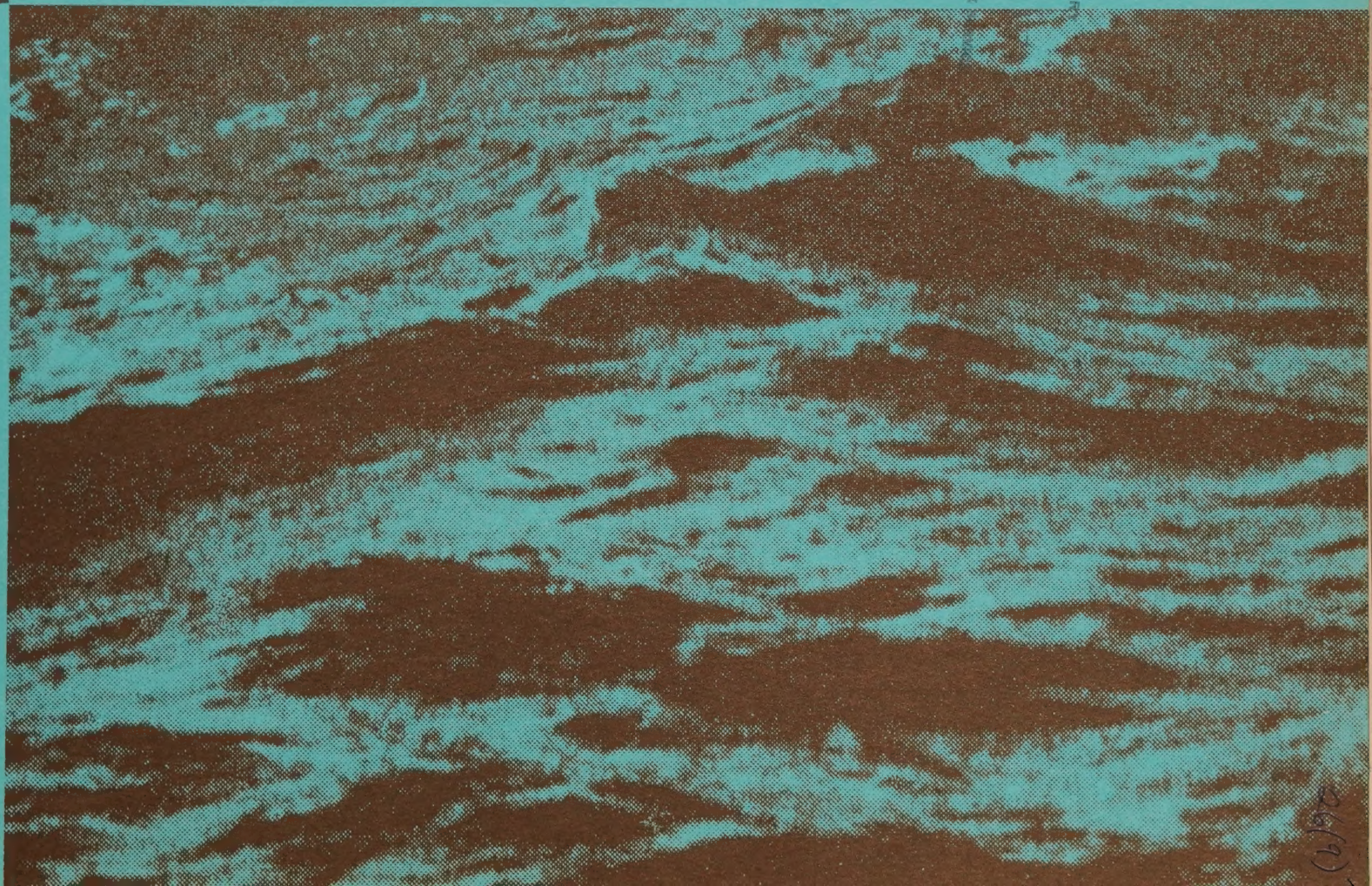
UNITED STATES
DEPARTMENT OF
COMMERCE
PUBLICATION

Marine Fisheries Abstracts

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

SEP 2



SEPTEMBER 1973

VOLUME 26
NUMBER 9

Seattle, Wash.

UNITED STATES DEPARTMENT OF COMMERCE
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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

For sale by the Superintendent of Documents, U.S. Government Printing Office Washington, D.C. 20402 - Subscription price: $6.50 per year, ($1.75 additional for foreign mailing). Single copy 65 cents.

0.35 (9.19) NUCLEAR MAGNETIC RESONANCE STUDIES OF 1,1-DICHLORO-2,2-BIS(p-CHLOROPHENYL)ETHENE IN AQUEOUS PHOSPHOLIPID DISPERSIONS

Haque, R., I. J. Tinsley, and S. E. Randall (Dept. of Agricultural Chemistry and Environmental Health Sciences Center, Oregon State University, Corvallis, OR 97331)
Biochemistry 12, No. 12, 2346-2350 (June 5, 1973)

It is known that the toxicity of 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane and related compounds usually involves the nervous system. Apparently, perturbations in axonic transmission are manifested by changes in action potential that can in turn be associated with changes in ion efflux; various researchers have suggested that DDT acts by influencing the permeability of the membrane. Inasmuch as these compounds are hydrophobic in character, they might be expected to interact with the membrane lipoprotein complex. Because little information is available in this area, the authors used nuclear magnetic resonance (nmr) techniques to study the binding of DDT and related compounds with lipids. In the present study, the proton magnetic resonance spectrum of DDE was recorded in dispersions of various phospholipids in D_2O. The phospholipids included DL-α-lecithin, egg yolk lecithin, sphingomyelin, phosphatidylserine, and phosphatidylethanol amine. It was found that the ring proton spectrum of DDE showed changes in the line shape as a function of concentration of phospholipid and temperature of the solution. At higher levels of phospholipid or at higher temperatures a new peak low field to the original appeared. Similar tests with DDT did not result in such concentration and temperature

0.38 (1.92)(9.19) METABOLISM OF DIAZINON BY FISH LIVER MICROSOMES

Hogan, James W. (Fish-Pesticide Research Laboratory, U.S. Bureau of Sport Fisheries and Wildlife, Columbia, Mo.), and Charles O. Knowles
Bulletin of Environmental Contamination and Toxicology 8, No. 1, 61-64 (July 1972)

[Diazinon is the trade name of an organophosphate insecticide. Abstractor's note.] The metabolism of radioactive Diazinon (ethoxy-^{14}C-diazinon) in vitro by subcellular hepatic preparations from channel catfish was investigated. The liver preparation was incubated with the radioactive Diazinon for 2 hr. (with shaking) in a water bath at 25° C. The preparation was then separated into water and ethyl acetate soluble fractions. Diazinon and its metabolite diazoxon, in the ethyl acetate fraction, were separated by thin-layer chromatography. Water-soluble metabolites were identified by ion-exchange chromatography. Liquid scintillation spectrometry was used to identify the quantities of radioactive compounds.

The results of the experiments indicate that the metabolism of Diazinon was accomplished most actively by the microsomal fraction of the fish liver homogenate. The enzyme system in the microsomal fraction required NADPH and oxygen for the oxidative desulfuration of Diazinon to diazoxon and subsequent cleavage.
[3 tables, 9 references] SW

0.39 EGG TAINTS: ASSOCIATION WITH TRIMETHYLAMINE

Hobson-Frohock, A., D. G. Land, Nerys M. Griffiths, and R. F. Curtis (Chemistry Div., ARC Food Research Institute, Colney Lane, Norwich NOR 70F, England)
Nature 243, No. 5405, 304-305 (June 1, 1973)

A previous report indicated that brown-shelled eggs with a characteristic "fishy" or "crabby" odor were produced in various parts of the United Kingdom during late 1971 and early 1972. This problem had occurred in the same season in earlier years.

The authors examined birds from a flock that had an outbreak of tainted brown eggs. "Bad breath" is a condition associated with tainted eggs, and 20 birds with this symptom were selected for study with no change in diet. The eggs produced by this group were evaluated, and those found to be tainted were analyzed for the compounds that caused the odor. These eggs, at pH 7-8, were freeze dried, and the distillate was collected at a temperature of -198° C. The condensate was thawed, acidified to pH 3, and freeze dried. Subjecting the condensate to gas chromatography gave peaks corresponding to trimethylamine. The tainted eggs contained more than 1.0 μg. per $g.^{-1}$ of trimethylamine; untainted eggs contained less than 0.1 μg. per $g.^{-1}$. Most of the trimethylamine was in the yolk. The same birds fed a control diet produced no tainted eggs. When trimethylamine was fed to the birds, they produced tainted eggs. Fifteen year-old brown chickens with no record of producing tainted eggs were fed the control diet and then fed trimethylamine. Only two of these birds produced eggs containing 10-40 μg. per $g.^{-1}$ trimethylamine. The authors concluded that tainted eggs and bad breath are associated only with certain

0.4 "ELECTROMOTOR" RESPONSE IN THE ELECTRIC FISH EIGENMANNIA (RHAMPHICHTHYIDAE, GYMNOTOIDEI)

Heiligenberg, Walter (Dept. of Neurosciences, 1219 Ritter Hall, University of California, San Diego, La Jolla, CA 92037)
Nature 243, No. 5405, 302-304 (June 1, 1973)

The behavioral relevance of electrical signals emitted by fish was investigated. An earlier report showed that the distortion of a fish's own electrical field due to an object could be used by the fish in detection of that object. Another report indicated that a fish of the Eigenmannia genus hovers in plant thickets during the day. When placed in an aquarium without vegetation, the fish hovers in hanging bundles of plastic strips; in addition, the fish tries to maintain its relative position if the strips are gently moved. In a variation of the experiments with plastic strips, the authors suspended three Plexiglas strips vertically in the center of an aquarium so that, viewed from above, they could be imagined to be the points of a triangle with the baseline at the right and the apex at the left. Six blinded fish were tested and found to hover with the nose close to the "apex" strip and at least one side of their body near a "baseline" strip. When the strips were swung horizontally in unison, the fish maintained their positions relative to the strips. An identical arrangement was built with agar strips of electrical conductivity equal to the aquarium water. When the fish were placed in the aquarium with this arrangement, they attempted to position themselves relative to the strips. Unlike their behavior with the plastic strips, where they maintained a relative position, the fish bumped into the agar strips. When the agar

0.38 (0.6) EFFECT OF PROTEOLYTIC ENZYME PREPARATIONS ON THE QUALITY OF FROZEN FISH STUFFING

Bykova, V. M. (U.S.S.R.)
Chemical Abstracts 78, No. 7, 41727w (Feb. 19, 1973)

0.4

strips were swung, the fish could not respond by maintaining a relative position and usually swam away when struck by the strips. The authors suggest that the fish perceived the plastic strips electrically rather than mechanically, and they believe that this behavior can be called an electromotor response.
[2 figures, 8 references]

SW

0.4 (6.36) (9.6) MARINE PHARMACOGNOSY ACTION OF MARINE BIOTOXINS AT THE CELLULAR LEVEL

Martin, Dean F. (Dept. of Chemistry, University of South Florida, Tampa, Fla.), and George M. Padilla (Editors)
Academic Press, New York, N.Y. (1973), xii + 317 pp. Price not given.

This book brings together the present state of knowledge of the activity of selected marine drugs especially as tools in the study of cellular functions. The contributors have presented details of methods of isolation and characterization of bioactive agents, kinetics of toxin-induced hemolysis, measurement of muscle contraction, toxin-induced alterations, bioassays, and microcolorimetry. These contributions may help to extend the application of the techniques to other relevant problems in physiology, pharmacology, and other fields. Bioactive substances have been isolated from such marine animals as sponges, jellyfish, worms, snails, octopuses, lobsters, starfish, sea urchins, sea cucumbers, squids, scorpionfish, turtles, and snakes. Bioactive substances have also been isolated from marine plants such as bacteria, fungi, red and brown algae, and flagellates. There are 19 chapters in the book treating of selected toxins and modes of action. Each chapter has an exceptensive list of references. A subject and author index are included.

SW

0.39

individual birds. At least two factors must coincide in the bird and the diet to produce trimethylamine in the eggs. Further investigations are in progress to identify the factors. The authors also state that fish meal is not involved.
[3 references]

SW

0.31 (9.6) PROGRESS IN THE CHEMISTRY OF FATS AND OTHER LIPIDS. VOLUME XIII (COMPLETE)

Holman, Ralph T. (editor) (Hormel Institute, University of Minnesota, Austin, Minn.)
Pergamon Press, Inc., Maxwell House, Fairview Park, Elmsford, NY 10523 (June 1973), 296 pp. Price $27.00.

This volume includes the following articles:
"Spin-Labeling with Nitroxide Compounds. A New Approach to the in vivo and in vitro Study of Lipid-Protein Interaction," by W. T. Roubal.
"The Effect of Ionizing Radiation on Lipids," by W. W. Nawar.
"Odor and Flavor Compounds From Lipids," by D. A. Forss.
The book should be of interest to researchers and advanced students concerned with lipid chemistry.

FTP

0.39 CELLULAR HEAT INJURY

Bowler, K., C. J. Duncan, R. T. Gladwell, and T. F. Davison (University of Durham, Durham, England)
Comparative Biochemistry and Physiology 45, No. 2A, 441-450 (June 1973)

There are two widely accepted hypotheses with regard to the causes of cellular heat injury and heat death: denaturation of proteins and the "melting" of cellular lipids. There is little information available relating the temperature sensitivity of these cellular components with that of the whole animal. For example, enzymes have been found to be less sensitive to high temperature than is the cell from which they originated.

In earlier work, one of the authors reported that in the crayfish Astacus pallipes a drastic breakdown in passive permeability to sodium and potassium ions occurs early in death at 35° C. Two of the authors, in another report, found that the increase in permeability was correlated with an impairment of the bioelectric properties of muscle and with the inactivation of a membrane bound ATPase. In another earlier report, one of the authors working with the blowfly Calliphora erythrocephala found a correlation between the LD_{50} (at 40.5° C.) and loss of respiratory control and the coupling of oxidative phosphorylation by sarcosomes.

The authors suggest that cellular heat injury (and heat death) is a membrane event and may be related to the stability of lipoprotein complexes, as well as to the state of phospholipids or proteins.
[2 figures, 1 table, 35 references]

WS

0.35 (9.19)

effects. DDT showed one set of resonance peaks corresponding to the crystalline phase. This behavior is probably due to the difference in hydrophobic character and in the configuration of the two chemicals. The difference in the behavior of DDT and DDE may be related to their marked difference in biological activity.
[6 figures, 2 tables, 26 references]

FTP

0.5 DEEP-SEA MICROORGANISMS: IN SITU RESPONSE TO NUTRIENT ENRICHMENT

Jannasch, Holger W., and Carl O. Wirsen (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Science 180, No. 4086, 641-643 (May 11, 1973)

Previously, the authors reported that mixed laboratory cultures and surface-borne marine bacteria, incubated in the deep sea, did not convert substrates actively. The authors investigated the possibility that indigenous microbial flora of the deep water or sediment may respond differently. Equipment was devised that permitted sterilized media in bottles to be inoculated directly on the sea bottom. The equipment was attached to the research submersible vessel Alvin and placed on the sea floor (1,830 m.) where it was inoculated and incubated. The site was marked and revisited by Alvin during the summer seasons of 1971 and 1972. The media contained either 0.1% starch, 0.033% agar, or 0.1% gelatin. Other media contained 0.01% KH_2PO_4 plus K_2HPO_4 and 0.025% NH_4Cl. After the incubation period of several seasons, the bottles were retrieved and poisoned (exposed to mercuric chloride [$HgCl_2$]). Starch, agar, and gelatin concentrations in the media were measured to determine if these substances had been consumed in metabolic activity. Sterile samples of balsa and beech wood, paper, and thalli of marine algae were also subjected to possible use as a substrate in a similar manner. Sterile controls were kept for the same period at the approximate deep-sea temperature of 3°-4° C. Using the same inoculation and incubation procedure, isotopically labeled mannitol, sodium acetate, sodium glutamate, and casamino acids in various concentrations were deposited on the sea floor and maintained for 14 weeks. In a duplicate set, the

0.5 (2.9)(3.5) BACTERIAL PRODUCTION OF DI-METHYL NITROSAMINE IN SALTED FISH

Fong, Y. Y. (Dept. of Biochemistry), and W. C. Chan (Dept. of Pathology, University of Hong Kong, Hong Kong)
Nature 243, No. 5407, 421-422 (June 15, 1973)

In earlier work, the senior author and his colleague demonstrated the presence of di-methyl nitrosamine (DMNA) and di-ethyl nitrosamine (DENA) in appreciable quantities in Chinese salted marine fish from markets in Hong Kong. These compounds were produced from the action of bacteria on the nitrate in the crude salt used to prepare the salted fish. Viable cultures on salt agar were obtained of nitrate reducing Staphylococcus aureus and halobacteria. In the present study, the authors found that this particular S. aureus was instrumental in increasing the DMNA content of fish broth.

Homogenized Chinese salted fish was divided into three equal portions. One portion was sterilized by heating it in a water bath at 70° C. for 1 hr. daily. The second portion was heated in a similar manner and then was inoculated with the S. aureus. The third portion was left untreated. The portions were incubated at 37° C. and analyzed for DMNA content on day 0, 1, 2, 3, 5, and 7. The nitrate content of the original homogenized fish broth was 40 p.p.m.; the nitrite content, 5 p.p.m.; and the DMNA content, about 0.1 p.p.m.

The sterilized fish broth showed no change in DMNA content. The untreated and the inoculated fish broths showed progressive increases in DMNA content, with the rise in DMNA content of the former lagging 1 day behind the latter. The DMNA content of the inoculated broth on the 7th day was just a little over 0.6 p.p.m.,

0.5 (2.05) INTERACTING EFFECTS OF pH, TEMPERATURE, AND SALT CONCENTRATION ON GROWTH AND SURVIVAL OF VIBRIO PARAHAEMOLYTICUS

Beuchat, L. R. (Dept. of Food Science, University of Georgia Agricultural Experiment Station, Experiment, GA 30212)
Applied Microbiology 25, No. 5, 844-846 (May 1973)

Previous workers demonstrated that V. parahaemolyticus would grow at 22° and 42° C., at pH 5 to 11, and at NaCl levels of 1 to 7%. The purpose of the present study was to establish the minimal pH values at which the organism would grow in an artificial, liquid medium. Six strains of V. parahaemolyticus were tested. Trypticase-soy-broth containing 3% or 7% NaCl was used. Data for three of the strains of V. parahaemolyticus used are shown in the table that follows. Growth occurred at pH 4.8 and at 5° C. The author cautions that these data were derived by use of liquid media and that results in food products or other natural substrates may be different. He believes, however, that the data should be useful when checking for the causative organism in foodborne outbreaks where V. parahaemolyticus is suspect.
[1 figure, 1 table, 5 references] FTP

0.5 (2.05) EVALUATION OF POTENTIAL RISK OF BOTULISM FROM SEAFOOD COCKTAILS

Lerke, Peter (G. W. Hooper Foundation, Laboratory for Research in the Canning Industries, 1950 Sixth Street, Berkeley, CA 94710)
Applied Microbiology 25, No. 5, 807-810 (May 1973)

Although seafood cocktails have not been implicated in cases of botulism, experimental evidence as to their safety has not yet been established. This study was carried out to assess the risks of botulism from seafood cocktails.

Thirty-five samples of commercial seafood (crab, shrimp, lobster, or fish) cocktails ranged in pH from 4.10 to 4.85, and none of them showed detectable Clostridium botulinum E. At 30° C., toxinogenesis in homogenates of crab meat inoculated with 10,000 spores of C. botulinum E and acidified with a citric-acetic acid mixture was prevented at pH 4.86 or lower; for homogenates of shrimp, under the same conditions, toxinogenesis was prevented at pH 5.03 or lower. To insure the safety of seafood cocktails the author recommends two requirements for preparation of the products: (1) The initial pH of the sauce should be no higher than 3.70, and (2) as soon as possible after the product is prepared, it should be chilled to at least 10° C. and held refrigerated for 24 hr. These recommendations are based on the results of tests on acid penetration into the centers of large pieces of seafood.
[4 tables, 10 references] FTP

0.5 (2.05)

Strain of *Vibrio parahaemolyticus* [1]	Temperature	Minimum pH for growth of the organism			
		In 3% NaCl, TSB [2]		In 7% NaCl, TSB [2]	
		Moderate growth	Extensive growth	Moderate growth	Extensive growth
	0° C.				
	5	7.7	--	7.6	--
	9	7.5	7.8	7.3	7.7
8700	13	5.2	5.6	6.0	6.1
	21	4.9	5.1	5.6	5.7
	30	4.8	5.2	5.3	5.4
	5	7.3	--	7.3	--
	9	7.1	7.6	7.3	7.7
0	13	5.2	5.6	5.5	6.0
	21	5.0	5.4	5.1	5.4
	30	5.0	5.1	5.0	5.3
	5	7.7	--	7.5	--
	9	7.7	7.8	7.3	7.8
4750	13	5.6	5.8	5.7	5.9
	21	5.4	5.5	5.4	5.5
	30	5.1	5.2	5.0	5.2

[1] Other strains reported in the original manuscript were: 107914, 284-72, and T-3765-1.
[2] TSB = Trypticase-soy-broth.

FTP

0.6 CONVERSION AND MANUFACTURE OF FOODSTUFFS BY MICROORGANISMS
(0.5)(9.6)

Anonymous
Saikon Publishing Co., Tokyo, Japan (1972), 297 pp. Price not given.
Food Manufacture 48, No. 5, 40 (May 1973)

This book contains all the papers and discussions, in English, presented at the Proceedings of the Sixth International Symposium of IUFoST held in Kyoto, Japan, in December 1971. The main section titles are: "Microbial Enzymes and Their Application to Food Processing," "Traditional Foods," and "Modern Microbial Foods." A list of participants in the symposium is provided. SW

0.5

samples were inoculated at a depth of 200 m. and incubated at a depth of 1,830 m. The degree of substrate conversion to cell material and CO_2 was measured by liquid scintillation spectrophotometry.

The results indicated that the enrichment of deep-sea water and sediment with various organic substrates did not increase the activity of the indigenous microflora within 1 year of incubation. There were no changes in the paper, wood, or algal samples. Inocula at 200 m. did not show activity on isotopic labeled substrates incubated at 1,830 m. for 14 weeks. The authors suggest that because the deep-sea bottom is devoid of organic matter available as a substrate, the activity of microorganisms in the deep sea may be confined to the intestinal tracts of animals. [1 figure, 2 tables, 11 references] SW

0.5 (2.9)(3.5)

and that of the untreated fish broth was about 0.5 p.p.m. Apparently, then, the DMNA content of fish would be dependent upon storage condition, degree of contamination by nitrate-reducing bacteria, and the amount of precursors present. FTP
[1 figure, 8 references]

0.5 PREDOMINANT AEROBIC BACTERIA OF FISH AND SHELLFISH
(7.86)(8.8)

Lewis, D. H. (Dept. of Veterinary Microbiology)
Sea Grant Publication TAMU-SG-73-401, Sea Grant College, Texas A & M University, College Station, TX 77840. (May 1973), 102 pp.

This report contains information on determinative outlines, methods, and materials (including media) for classifying the majority of the aerobic, heterotrophic bacteria associated with fish and shellfish. Included, also, are methods for analysis for nucleic acid base ratio and a computer program for numerical taxonomy. FTP
[7 figures, 141 references]

0.6 PROBLEMS IN THE PRODUCTION OF SEMIPRESERVED FISH

Meyer, V. (Bundesforschungsanst. Fisch., Hamburg, Germany)
Chemical Abstracts 78, No. 11, 70256x (Mar. 19, 1973)

0.7 (6.190) DETERMINATION OF THE METABOLIC FAECAL NITROGEN AND THE ENDOGENOUS URINARY NITROGEN ON MINK

Hansen, N. Glem, and G. Jørgensen (National Research Institute of Animal Nutrition, Experimental Fur Farm, Hillerød, Denmark)
Acta Agriculturae Scandinavica 23, 34-38 (1973)

The determination of the biological value (BV) of protein for maintenance and growth [K. Thomas, Arch. Anat. Physiol. Abt.: 219 (1909) and H. H. Mitchell, J. Biol. Chem. 58, 873 (1924)] is used with rats and other species of domestic animals. The equation for the calculation of BV depends upon the values for metabolic fecal nitrogen (metabolic N) and endogenous urinary nitrogen (endogenous N); these values cannot be determined directly in a single experiment. This article reports on the adaptation of the Thomas-Mitchell method to mink. One hundred and thirteen nitrogen balance tests were carried out to determine the influence of nitrogen intake, body weight, weight increment, age, and dry matter intake on the amount of metabolic N and endogenous N in mink. Multiple regression analyses indicated that all these parameters significantly influenced the metabolic N and the endogenous N. Multiple regression equations for the calculation of metabolic N and endogenous N are:

Metabolic N = 0.26 - (kg. body weight × 0.075) - (gram weight gain × 0.00025) + (age in weeks × 0.004) + g. dry matter consumed × 0.0004).

Endogenous N = 0.02 + (kg. body weight × 0.08) - (gram weight gain × 0.00054) + (age in weeks × 0.00377) - (gram dry matter × 0.00085).

[3 figures, 4 tables, 14 references] FTP

0.8 OCEAN TEMPERATURE GRADIENTS: SOLAR POWER FROM THE SEA

Metz, William D.
Science 180, No. 4092, 1266-1267 (June 22, 1973)

The temperature of the surface of the ocean lying between the Tropic of Cancer and the Tropic of Capricorn remains constantly at 25° C. Due to the equilibrium between the heat collected from sunlight and the heat lost by evaporation and other processes, the warm water moves toward the poles, and the cold water at the poles sinks into the depths and moves toward the Equator. In the tropics, this cold water is located 1,000 m. from the surface and, at a temperature of 5° C., provides a heat sink. This temperature differential can be used to generate electricity. The concept originated with the French physicist Jacques D'Arsonval in 1881 and is now being investigated by researchers in the United States. One of these studies was based on a design of a submerged power plant with a practical efficiency of 2 to 3%. In this plant, the 25° C. (hot) water would flow through a heat exchanger where it would cause the "working fluid," such as ammonia, to boil. The vapor (or steam) from the boiling working fluid would drive a turbine and then be condensed back to the fluid state in a condenser cooled by cold (5° C.) sea water. The energy derived from this temperature differential would be the same as the energy potential of a hydroelectric plant with a pressure differential corresponding to 93 ft. of elevation. Such a power plant is projected to cost very little more than conventional power plants because the sea acts as a medium for collecting sunlight and storing energy. In addition, the hydrostatic pressure of the sea against the submerged system would permit the walls of the pressure vessels to be quite thin,

0.8 HOW THE ENERGY CRISIS WILL SPUR OCEAN-RELATED ACTIVITIES

La Motte, Clyde
Ocean Industry 8, No. 6, 75-76 (June 1973)

The energy crisis is going to cause a vast increase in ocean-related activities. One of the indicators of this predicted increase is the President's message on energy to the Congress which calls for tripling the amount of offshore acreage to be offered annually for oil exploration between now and 1979. There will be a corresponding increase in the numbers of offshore drilling platforms, drill pipe, service boats, helicopters, pipe lines, and other equipment. The areas of increased activity include the Gulf of Mexico, the Gulf of Alaska, and the Atlantic and California shorelines.

In addition to the oil searches on the coasts, imports of petroleum from overseas will increase and will be carried in larger tankers. The daily worldwide movement of petroleum over water in 1972 totaled 29 million barrels (information from the National Petroleum Council, Dept. of the Interior). The United States is now dependent on foreign sources for 30% of its oil needs. By 1985 this dependence is expected to increase to 50% of its needs. Natural gas (liquified) is also anticipated to be shipped to the United States in 1985 at the rate of 90 million barrels annually in highly specialized vessels. Facilities for receiving such quantities will have to be constructed in the United States. The President recommended the construction of new deepwater ports. Use of smaller vessels (30,000 dwt) requiring 18,000 annual ship calls will increase port congestion and the opportunity for accidents. Optimally sized ships of 250,000 dwt would reduce transportation costs, and annual port activity would be reduced to 3,000 ship calls.

0.9 VALUE OF DRIED CATTLE MANURE AS A FEEDSTUFF FOR POULTRY

Lipstein, Bianka, and S. Bornstein (Division of Poultry Science, Agricultural Research Organization, The Volcani Center, Bet Dagan, Israel)
Feedstuffs 45, No. 24, 22-23, 30 (June 11, 1973)

The purpose of this study was to determine (1) the effects of diets containing dried cattle manure (DCM) on the well-being and performance of growing and of laying chickens and (2) the utilization of the energy and the nitrogen of DCM by these chickens. The DCM was obtained from a drying plant and apparently was produced under rather primitive drying methods. The DCM was substituted in the rations in different amounts, up to 30%, for sorghum grain or for pulverized basalt rock.

DCM did not seem to have any caloric value for growing chickens, but its metabolizable energy content was estimated at about 500 kcal./kg. for laying chickens. Apparent retention of nitrogen from DCM was low. DCM, therefore, is an unsuitable dietary ingredient from the standpoint of its nutritive contribution to chickens, unless the purpose of its addition is to lower nutrient density. Data on the composition of DCM are shown in the table that follows.

0.8

because the outside pressure would be balanced by the internal pressure. Not only could electricity be generated, but the system could also produce fresh water through condensation of the warm water vapor by the flow of cold water. Another possibility is the use of the nutrients in the cold water for aquaculture projects such as algae, crustaceans, and shellfish culture. More study is needed to improve designs and make cost estimates more accurate, but solar power may become a source of clean energy in the future.
[1 figure] SW

0.8 REMOVAL OF FAT AND SUSPENDED MATTER FROM WASTE WATERS
(9.19) OF FISH-CANNING ENTERPRISES

Shifrin, S. M., I. B. Pesenson, and A. N. Zabbarov (U.S.S.R.)
Chemical Abstracts 78, No. 24, 151286j (June 18, 1973)

0.9

Item	Composition of dried cattle manure	
	Sample 1	Sample 2
Moisture (%)	7.9	9.4
Crude protein (N x 6.25) (%)	12.4	11.6
Crude fat (%)	1.6	2.0
Fiber (%)	23.5	20.7
Ash (%)	26.1	31.0
Calcium (%)	2.3	2.8
Phosphorus (%)	0.7	0.7
NaCl (%)	2.2	1.5
N.F.E. (%)	28.5	25.3
Gross energy (cal./g.)	3.05	2.92
Specific gravity (g./ml.)	0.36	0.36

[3 figures, 3 tables, 18 references] FTP

0.8 WATER QUALITY: MANAGEMENT AND POLLUTION CONTROL PROBLEMS
(9.19)(9.6)

Jenkins, S. H. (editor)
Pergamon Press, Inc., Maxwell House, Fairview Park, Elmsford, NY 10523 (Apr. 1973), 368 pp. Price $24.00.

This book contains the proceedings of the 6th Conference of the International Association on Water Pollution Research held in Jerusalem in June 1972. The sessions dealt with subjects such as water pollution control programs, education and training for water pollution control, quality criteria of wastewater, behavior of certain pollutants in aqueous systems, sanitation, wastewater treatment, and corrosion in collection systems. The book should be of interest to engineers, chemists educators, and administrators concerned with water quality. FTP

0.8

Another possible ocean-related activity that would be new would involve construction of power plants in offshore locations. The author recommends that jurisdiction to prescribe standards regarding marine pollution should be vested exclusively in international organizations. With regard to seabed pollution caused by local operations, jurisdiction to prescribe standards for control should be vested in the adjacent country, with international standards as the final standard. SW

0.9 PROCEEDINGS: FOURTH NATIONAL SEA GRANT CONFERENCE
(6.0)

Sea Grant Publication WIS-SG-72-112, University of Wisconsin, Madison, WI 53706 (1972), 248 pp. Available from the Sea Grant Communications Office, 1225 West Dayton St., University of Wisconsin, Madison, WI 53706)

This bulletin reports some of the material presented at the fourth conference of the Association of Sea Grant Program Institutions. It contains 5 addresses and 27 reports of the various sessions dealing with aquaculture, advisory services, coastal zone management, legal-economic aspects of the fisheries, ocean engineering, marine resources education, and economics. A list of the names and addresses of the 199 participants is given. FTP

1.0158 (1.0152) (1.0153) GENERAL REVIEW OF THE TRAWL FISHERY AND THE DEMERSAL FISH STOCKS OF THE SOUTH CHINA SEA

Shindo, Shigeaki (Tokai Regional Fisheries Research Laboratory, Tokyo, Japan)
FAO Fisheries Technical Paper No. 120, Food and Agriculture Organization of the United Nations, Rome, Italy (Apr. 1973), v + 49 pp. (Distribution restricted)

The South China Sea (Nan Hai in Chinese) is a part of the Pacific Ocean bordered on the west by the Asian coast, the southern edge of the Gulf of Thailand, and the east coast of the Malay Peninsula. The South China Sea is bordered on the south by the islands of Sumtra and Borneo. The northern boundary coincides with the waters between the northern tip of Taiwan and the Province of Fukien on the coast of Mainland China.

The landings of fish in the tropical and temperate zones of the sea are composed of many species in contrast to the fewer dominant species caught in polar areas. In the catch statistics gathered through several years of the fisheries, the following species predominated: conger pike eel, Muraenesox cinereus; croakers, Sciaenidae; golden threads, Nemipterus spp.; pony fishes, Leiognathidae; horse mackerel, Caragidae; and wolf fishes, Chirocentridae.

According to the fish stock evaluation presented in the review, the demersal fish stocks on the Mainland Shelf have been intensively exploited. A further increase in the fishing effort is not recommended. The Sunda Shelf is bordered by Vietnam on the north, Borneo on the east, and the Malay Peninsula on the south. With the exception of the Gulf of Thailand, the demersal stocks of the Sunda Shelf

2.1474 (2.6) TRAP-NET DEMONSTRATION AND MARKETING SURVEY RAINY LAKE

Thomson, R. T. (Fort Frances District)
Commercial Fish and Fur Branch, Division of Fish and Wildlife, Ministry of Natural Resources, Ontario, Canada (1972), 14 pp.

Under the ice, trap nets are used for harvesting crappie in Rainy Lake, Ontario. However, other fish, such as burbot (Lota lota), are abundant in the lake and trap net fishing might be an efficient method for their harvest. Therefore, a demonstration was carried out for the commercial fishermen on the use of the trap net for harvesting the burbot. In addition, to encourage the utilization of burbot, a survey was made on the acceptability and marketability of the product. This bulletin reports the results of the demonstration and survey. The setting of the trap net under ice is briefly described. The figure that follows shows the arrangement of the trap net in place in the lake under the ice. The acceptance of the product by consumers was generally favorable. FTP
[3 figures, 2 references, appendix]

1.36 (9.19) RECENT CHANGES IN ATLANTIC SALMON (SALMO SALAR) RUNS IN THE LIGHT OF ENVIRONMENTAL CHANGES IN THE SAINT JOHN RIVER, NEW BRUNSWICK, CANADA

Dominy, C. Leslie (Environment Protection Service, P.O. Box 5667, St. John's Newfoundland, Canada)
Biological Conservation 5, No. 2, 105-113 (Apr. 1973)

The waters of the Saint John River basin are used for various purposes, some of which are in direct conflict with each other. The major uses of water in the river are for waste disposal from industries, municipalities, and hydroelectric power, and as a water supply for the same groups. Deterioration of water quality has increased substantially over the past two decades. The biological assimilative capacity of the river has been reduced by untreated organic and toxic wastes, and by hydroelectric power developments. The effects of these changes on the Atlantic salmon have been to reduce the quality of its migration route to and from the sea, eliminate some of its spawning and rearing areas, and cause direct mortality of adults and juveniles. Consequently, the total salmon stock in the river has declined about 40% over the past 20 years. In view of government activities in comprehensive planning for water resources, water quality management to reduce pollution, and improved fishery management on the Saint John River, future prospects for conserving its salmon resource are moderately bright. SW
[5 figures, 3 tables, 13 references]

2.1477 (2.1473) (1.017) REPORT ON THE INVESTIGATIONS OF THE 'LLORET LOPEZ II' 8 JANUARY TO APRIL 1970. SECTION 4 POLEFISHING AND TROLLING METHOD; SECTION 5 LONGLINING METHOD

Webb, B. F. (Fisheries Division, Marine Dept., Wellington, New Zealand)
Fisheries Technical Report No. 105, New Zealand Ministry of Agriculture and Fisheries, Wellington, New Zealand (1973), 38 pp.

Section 4.--Polefishing for tuna is described, with modifications for New Zealand conditions. The equipment needed and the technique used are illustrated by photographs and diagrams. A description is given for a polefishing vessel.

Section 5.--Longlining for tuna is described. Descriptions and illustrations of the gear, with modifications for New Zealand conditions, and of the method are given. A 35-38 m. vessel was considered best suited to the New Zealand area conditions. [14 figures, 23 illustrations, 9 references] FTP

1.4 [THE REDFISH SEBASTES MARINUS SPECIES. FISHERY, BIOLOGY, EXPLOITATION] LE SEBASTE, SEBASTES MARINUS SP. LIEUX DE PÊCHE, BIOLOGIE EXPLOITATION

Hamon, P. Y. (Lab. ISTPM, St. Pierre et Miquelon, France)
Rev. Trav. Inst. Pêches Marit., Nantes, France 36, No. 3, 337-352 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 4, 247, Abstract No. 3Q4316M (Apr. 1973)

The term 'redfish' includes four different species: Sebastes marinus mentalla, S. m. marinus, S. viviparus, and Helicolenus dactylopterus. The biology, distribution, and exploitation of the first two species are presented. These fish are widely distributed over the North Atlantic Ocean. The following coastal areas are described in detail: Labrador, Newfoundland, Cape Breton, Nova Scotia, Gulf of St. Lawrence, Georgia Bank, and Nantucket. The biology of the redfish is described and includes parasites, nutrition, and relationship to other species. Details of productivity, catches and export, and the state of the stock are given. If the stocks are not depleted, the young population of the St. Pierre Bank will be very important in a few years. SW

1.9 (1.0119) THE COMMERCIAL FISHERY FOR AMERICAN EEL, ANGUILLA ROSTRATA (LESUEUR), IN LAKE ONTARIO

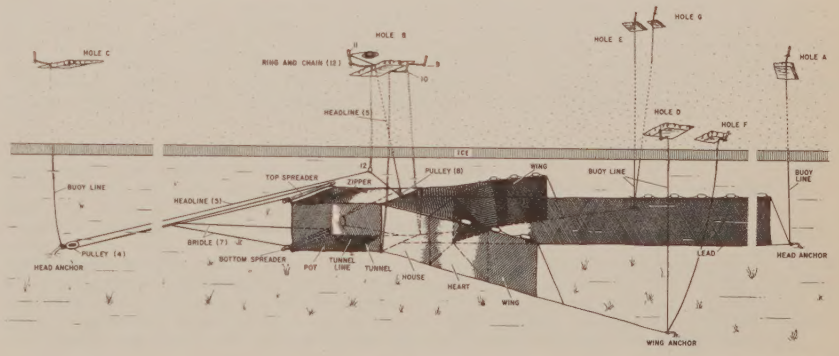
Hurley, Donal A. (Ontario Ministry of Natural Resources, Maple, Ontario, Canada)
Transactions of the American Fisheries Society 102, No. 2, 369-377 (Apr. 1973)

In the late 1950's the American eel was a nuisance because it destroyed fish caught in gill nets, damaged the nets, and was low in commercial value. Increased consumer demand (in North America and Europe) forced the price of eels up, and, in the 1960's, they became an additional source of income when the stocks of other lake fish were declining. Most eels are caught by baited hooks on set lines which are placed over distances of up to a mile and are buoyed in about 25 ft. of water. Hoop nets and trap nets are used in shallow water. Set lines were used to catch 61% of the annual catch; hoop nets were used to catch 27% and trap nets about 7%. Seines were used by a few fishermen and these catches have been substantial. Since 1959, landings of eel by Canadian fishermen have ranged between 108,000 and 241,000 lb. These catches have been 70% to 90% of the total eel catch and are the only statistics mentioned in the article. The peak catch occurred in 1964. Since then the recent annual catches have been about 160,000 lb. Since the late 1950's, eel stocks have been exposed to two hazards: increased fishing pressure and the Moses-Saunder hydroelectric dam. A decrease in the catch of large eels (900 to 1,000 mm. length) is attributed to increased fishing pressure. The total catch was maintained by an increase in the numbers of small eels (500, 600, and 700 mm. length) taken. Hoop nets caught the largest eels and set lines, the smallest. Completion of the dam across the St. Lawrence River has not completely prevented migration of eel into and out of Lake Ontario; the dam either holds back or prevents a proportion of the eels from entering the lake. How these eels enter the lake is not known. [2 figures, 8 tables, 5 references] SW

1.0158 (1.0152)(1.0153)

are relatively underutilized. Further expansion of fishing intensity may be possible. In the Gulf of Thailand, the stocks are now overfished, and management action without delay is recommended to protect the demersal fish resource. There are many areas in the South China Sea which have banks, reefs, and rocky bottoms that are unsuitable for trawls. Most of these grounds are in a virgin state; the north coasts of Borneo and Palawan are examples. Bottom longline or vertical line gear is useful in such areas.
[6 figures, 25 tables, 46 references] SW

2.1474 (2.6)



Arrangement of the trap net in place under the ice.

2.8 ACCEPTANCE OF PRECOOKED FROZEN CHICKEN REHEATED BY MICROWAVE ENERGY

Sison, E. C., L. E. Dawson, and Elizabeth Payne (Dept. of Food Science and Human Nutrition, Michigan State University, East Lansing, MI 48823)
Poultry Science 52, No. 1, 28-34 (Jan. 1973)

Chicken pieces were breaded and then precooked under pressure in corn oil. The precooked pieces of breaded chicken were frozen using air blast (-37° C.), nitrogen (-57° C.), or Freon-12 (-43° C.), packaged in polyethylene bags, and then stored at -18° C. for up to 6 months. To test the acceptance of the chicken, the frozen pieces were reheated in a microwave oven for 1.5 to 2.0 min. per piece (or 1 min. per 100 g.) and evaluated by a taste panel.

Apparently, microwave energy is a rapid method for thawing and reheating precooked and frozen chicken. The optimum reheating period is 1 min. per 100 g. of product. The precooked frozen breaded chicken parts were acceptable for more than 4 months when stored at -18° C. Rapid freezing rates (using nitrogen or Freon-12) did not enhance the acceptability of the product over that frozen in air at -37° C.
[4 figures, 4 tables, 20 references] FTP

3. THE ALMANAC OF THE CANNING, FREEZING, PRESERVING INDUSTRIES
(9.6)

Anonymous
The Almanac, P.O. Box 866, Westminster, MD 21157 (1973), 58th edition. Price US$12.50.

The Almanac contains information on personnel, food laws, labeling and packaging, standards, grades, statistics, prices, international trade, and buyers guide for machinery, supplies, and services. The 1973 edition contains the latest information on nutrition labeling regulations and on the good manufacturing practices for processing low acid foods. FTP

3.5 SAND- AND TIN-SALTED FISH. MUGIL CEPHALUS
(1.9)

ElMossalami, E., and M. F. Sedik (Fac. Vet. Med., Cairo Univ., Cairo, United Arab Republic)
Chemical Abstracts 78, No. 9, 56615g (Mar. 5, 1973)

4.11 NOVEL METHODS FOR EVALUATING DETERIORATION AND
(4.92)(0.7) NUTRITIVE VALUE OF OXIDIZED OIL

Akiya, Toshimi, Chuji Araki, and Kiyoko Igarashi (National Food Research Institute, Shinjo Branch, 4-19 Ishikawa-cho, Shinjo-shi, Yamagata-ken 996, Japan)
Lipids 8, No. 6, 348-352 (June 1973)

Several methods for estimating the toxicity of deteriorated fats and oils were tested. Peroxide value provides little indication of the toxicity of an oxidized oil, because some of the decomposition products of peroxides are also toxic. Also, peroxides are destroyed by heat, and frying fats, for example, may show low peroxide values even though they may be highly deteriorated. In the present tests, soybean oil with peroxide values of 10, 110, 180, and 380 and rapeseed oil with a peroxide value of 180 were used. The chicken embryo test of T. Miura, M. Tsuchiya, and K. Miyaki was found to be sensitive and to give reproducible results in evaluating the toxicity of the oxidized oils. In this test, 0.2 ml. of the oil is injected into the yolk sac of each of 10 eggs, and the eggs are then incubated at 38° C. and 68% relative humidity. An estimate of the toxicity of the oils is made on the basis of the mortality of the embryos after 24, 48, and 72 hr. of incubation. The chicken embryo test gave results equivalent to those based on the measurement of growth rate of weanling rats or mice fed deteriorated oils. An enzyme test using alkaline phosphatase showed some promise for estimating toxicity of oxidized oils. The reduction of the enzyme activity was used as a measure of the toxicity of the oil added to the enzyme substrate.
[3 figures, 5 tables, 15 references] FTP

4.6 POLYMERIZATION INHIBITORS FOR POLYUNSATURATED OILS
(2.8)

Sims, R. J., J. A. Fioriti, and M. J. Kanuk (General Foods Corporation, Technical Center, White Plains, NY 10625)
Lipids 8, No. 6, 337-341 (June 1973)

Methyl polysiloxane is used in frying oils to inhibit oxidative polymerization. It is functional at levels below 1 p.p.m. It probably forms a protective film at the oil-air interface thus limiting access to oxygen. In this study, several edible anionic surfactants were found to function as polymerization inhibitors for safflower oil. The most effective was the sodium salt of mono- and diglycerides. Other inhibitors included: sodium diacetyltartaric acid esters of mono- and diglycerides, sodium stearoyl-2-lactylate, sodium stearyl fumarate, sodium succinoylated mono- and diglycerides, dioctyl sodium sulfosuccinate, and sodium sulfoacetate esters of mono- and diglycerides. The authors believe that these surfactants perform in a similar manner to methyl polysiloxane.
[2 figures, 4 tables, 6 references] FTP

3.337 (0.8) ESTIMATION OF PROCESS CONDITIONS FOR CONTINUOUS STERILIZATION OF FOODS CONTAINING PARTICULATES

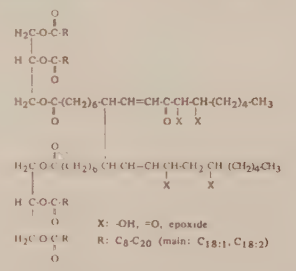
De Ruyter, P. W. (Food Research and Development Dept., John Labatt Ltd., P.O. Box 6089, Montreal 101, Quebec, Canada), and R. Brunet (Dept. of Mathematics, University of Montreal, Montreal, Quebec, Canada)
Food Technology 27, No. 7, 44-46, 48, 50-51 (July 1973)

There are two basic problems involved in the aseptically canning of food products containing particulate material. These are (1) providing a mechanical means of physically handling the products in a continuous heat/hold/cool/fill operation while maintaining proper distribution and integrity of the food particles, and (2) making certain of the commercial sterilization of the entire particle, at the same time taking advantage of the high-temperature/short-time process for maximum preservation of other qualities of the product. This article gives a method for estimating the process conditions, in a scraped-surface heat exchanger, required for the continuous sterilization of foods, containing particulate material, that are to be aseptically packaged. The authors derive the appropriate equations and discuss development of the computer program.
[4 figures, 1 table, 5 references] FTP

4.5 (4.92) CHARACTERIZATION OF TOXIC COMPOUND IN THERMALLY OXIDIZED OIL

Ohfuji, Takehiko, and Takashi Kaneda (Dept. of Food Chemistry, Tohoku University, Sendai, Japan)
Lipids 8, No. 6, 353-359 (June 1973)

In preliminary tests, the authors evaluated the toxicity to rats of polymerized soybean oils. The soybean oil was heated at 275° C. for 12 hr. in the presence of N_2 (thermally polymerized oil) or in the presence of air (oxidatively polymerized oil). The oxidatively polymerized oil retarded weight gain of rats more than did the thermally polymerized oil. By means of column chromatography and elution with ether, the authors were able to isolate a highly toxic dimeric material from the oxidatively polymerized oil. Although this dimeric fraction probably contained a large number of different chemical entities, a substantial part of it consisted of molecules of the following type:



[5 figures, 7 tables, 13 references] FTP

2.8 (4.91)(0.6) LIPID CHANGES IN EGG YOLKS AND CAKES BAKED IN MICROWAVE OVENS

Schiller, Elizabeth Ann, Dan E. Pratt, and Elwood F. Reber (Dept. of Foods and Nutrition, Purdue University, West Lafayette, IN 47906)
Journal of the American Dietetic Association 62, No. 5, 529-533 (May 1973)

Samples (50 g. each) of egg yolk, with and without added linoleic acid, were cooked (to 80° C.) by three methods: (1) in a conventional electric oven at 190° C., (2) in a microwave oven operating at 915 MHz, and (3) in a microwave oven operating at 2,450 MHz. After the egg yolk samples were cooked, they were blended with an equal amount of water and the lipids were extracted. Then, the dried extractants were analyzed for fatty acid content. TBA (thiobarbituric acid) values were also determined to serve as an indicator of the degree of oxidation of the lipids.

The fatty acid composition did not change and there was no measurable decrease in polyunsaturated fatty acids as a result of any of the three heat treatments. The egg yolk samples heated in the conventional oven did show higher levels of lipid oxidation. The level of oxidation of the lipids in the egg yolks heated by microwaves at 2,450 MHz were higher than that of the samples heated at 915 MHz. Apparently microwaves do not interact strongly with lipid molecules.
[6 tables, 14 references] FTP

4.13 (8.53) LIPIDS IN COMMERCIAL BALTIC SEA FISH. I. LIPID FRACTIONS OF MUSCLE TISSUE

Podeszewski, Zbigniew, Barbara Otto, and Halina Parfianowicz (Inst. Technol. Przetworstwa Rybn., Wyzsza Szk. Roln. Szczecin, Poland)
Chemical Abstracts 78, No. 7, 41749e (Feb. 19, 1973)

4.13 (4.2) LIPIDS IN COMMERCIAL BALTIC SEA FISH. II. FATTY ACIDS OF LIPID FRACTIONS

Scodolnik, Ludmila, and Zbigniew Podeszewski (Inst. Technol. Przetworstwa Rybn., Wyzsza Szk. Roln., Szczecin, Poland)
Chemical Abstracts 78, No. 7, 41750y (Feb. 19, 1973)

4.9 (0.4) EXACERBATION OF HEART AND LIVER LESIONS IN RATS BY FEEDING OF VARIOUS MILDLY OXIDIZED FATS

Kaunitz, Hans, and Ruth E. Johnson (Dept. of Pathology, Columbia University, New York, NY 10032)
Lipids 8, No. 6, 329-336 (June 1973)

In an earlier test carried out in the authors' laboratory, rats on a low iodine diet were fed eight fresh and mildly oxidized vegetable and animal fats. The average life span of the rats fed fresh vegetable oils was shorter than those fed fresh animal fats, and, also, rats fed the oxidized forms of three of the oils (olive, corn, and soybean) showed longer life spans. There was some indication that the fats exerted other effects that were not related to their fatty acid composition; it was theorized that fats (particularly vegetable oils) may contain biologically active substances in their nontriglyceride fractions that exert long-term effects. The present paper reports on a more comprehensive study using large groups of rats.

Charles River rats were fed diets containing cottonseed oil, corn oil, soybean oil, coconut oil, chicken fat, beef fat, butter oil, lard, and saturated medium chain triglycerides. The fats were used fresh and also after they were aerated at 60° C. for 40 hr. (This process barely changed the peroxide values of the fats.). Also, fresh and aerated soybean oil and lard were fed to groups of W/Fu rats.

The weight of the rats and their life span were influenced by the kind of fat fed, but they were not influenced by the feeding of aerated fats. The hearts of

6.1 TRACE METAL CONTENTS OF FISH MEAL AND OF THE LIPID PHASE EXTRACTED FROM FISH MEAL

Lunde, Gulbrand (Central Institute for Industrial Research, Forskningsveien 1, Blindern, Oslo 3, Norway)
Journal of the Science of Food and Agriculture 24, No. 4, 413-419 (Apr. 1973)

Samples of industrially produced fish meal made from herring, mackerel, Norway pout, and capelin were collected. The samples were taken from different factories in various localities in Norway; and the meals were made from fish caught at various times in the year. Meals from the same species of fish were made in the laboratory also. The meal samples were ashed before analysis. Samples of meals to be analyzed for trace elements in lipids were extracted in a chloroform-methanol mixture.

The following trace elements were found in the fish meal: selenium, cadmium, zinc, lead, copper, iron, and cobalt. In the lipid phase extracted from the meal, selenium, arsenic, bromine, zinc, iron, and copper were found. This information and source of the meal are tabulated. Relatively large amounts of phosphorus were also found in the lipid phase. The levels of zinc, lead, and iron were higher in industrially produced meals than in laboratory produced meals. The natural zinc to cadmium ratio in sea water was assumed to be 100:1; the results of the analysis indicated that zinc seemed to be enriched relative to cadmium in the fish meal. The

6.130 THE DEVELOPMENT OF A FISH MEAL PLANT

Howell, H. D.
Commercial Fish and Fur Branch, Division of Fish and Wildlife, Ministry of Natural Resources, Ontario, Canada (1972), 15 pp.

This pamphlet briefly describes the development of a fishmeal plant designed to process the fish waste from plants processing Lake Erie fish. The fish waste from the processing operations in the area amounted to about 10 million pounds per year. Disposal of the waste was a problem, and development of a fishmeal plant was considered as a method for economic utilization of the waste raw material. Preliminary tests showed that fish meal prepared from the processing waste of Lake Erie fish produced fish meal of high enough quality to be competitive with fish meal from other sources. It contained slightly over 60% protein and performed satisfactorily when used in the regular poultry diet.

The original equipment for the plant cost about $71,079 (the period of construction and implementation of the project was 1967 through 1969). This total cost included: press, $5,330; decanter (horizontal centrifuge), $5,015; drier, $21,138; hammer mill, $2,042; fish oil tank, $1,514; and building (including labor), $25,998.

The cost of producing a ton of meal (based on 1969 production figures) ran $76.91. This total included: labor (2 foremen, 2 helpers), $21.77; utilities--gas for drier, $6.00, steam for cooker, $8.00, and power, $3.20; maintenance supplies, $16.63; maintenance labor, $4.55; overhead (estimated), $3.45; capital cost--equipment, $11.37; and building, $1.97.

6.199 FLAVOUR STUDIES WITH FISH MEALS AND WITH FISH OIL FRACTIONS IN BROILER DIETS

Wessels, Jacobus P. H., Alison Atkinson, Roelof P. van der Merwe, and Johannes H. de Jongh (Fishing Industry Research Institute, Muldersvlei, Cape Province, Republic of South Africa)
Journal of the Science of Food and Agriculture 24, No. 4, 451-461 (Apr. 1973)

Earlier reports indicated that chicken diets containing fish meal stabilized with an antioxidant imparted a "tainted" flavor to the carcass compared to cured fish meals in the diet. Tests were performed to determine the effects of diet additives, such as certain amines, on the flavor of the chicken carcass. In addition, the effects on carcass flavor were determined for such compounds as triglyceride and phospholipid fractions of fish oil in fish meal.

At 20% levels in the diet, fish meals extracted with ethanol, benzene, or warm or acidified water were fed to broiler-type chickens. The diets were given to the broilers from their fifth week until they were slaughtered at 8½ weeks of age. The carcasses were subjected to organoleptic evaluation; and the fatty acid constituents of the fat in the carcasses and of the oils in the fish meals were determined by gas chromatography.

The results indicated that carcasses of chickens fed diets containing fish meals that were extracted with fat solvents had a full chicken flavor. Diets that contained fish meal extracted with warm water or a warm, weak acid solution produced carcasses with a neutral flavor. Unextracted fish meal at a 20% level in the diet or the triglyceride fraction of fish oil at a 2.0% level in the diet produced carcasses with a "fishy" flavor. The phospholipid fraction of fish oil in

6.130

The composition, on the average, of the fish meal produced from fresh-water fish waste was: protein, 66.9%; moisture, 4.4%; fat, 9.5%; calcium, 6.9%; and phosphorus, 3.6%. The amino-acid composition was (expressed as percent of the protein): arginine, 5.8%; cystine, 0.5%; histidine, 2.0%; isoleucine, 4.0%; leucine, 6.8%; lysine, 7.0%; methionine, 2.9%; phenylalanine, 3.7%; threonine, 3.6%; tryptophan, 0.8%; tyrosine, 3.2%; and valine, 4.9%.

The processing plant was established on the basis of the availability of at least 10 million pounds of fish waste annually. At a cost of producing the fish meal of about $77 per ton, about $2.75 per protein unit [One percent protein in the meal is equivalent to one protein unit.] for the meal and $0.07 per pound for the oil would have to be realized if a price of $0.01 per pound was to be paid for the raw material.
[1 figure, 5 illustrations, 5 tables]

FTP

6.199

the diet had no effect on carcass flavor. Adding amines such as trimethylamine, ethanolamine, and choline, to the diet aggravated the effects of the fishy flavor. A previous report of a high correlation between acceptable flavor and the levels of certain highly unsaturated fatty acid in the chicken carcass was confirmed in the tests. [3 tables, 15 references]

SW

6.197

RESPONSE OF EARLY WEANED PIGS TO DIFFERENT LEVELS OF PHOSPHORUS, SUPPLIED BY ASHED FISH MEAL

Blanco, Virgilio Sergio (Univ. Maryland, College Park, Md.)
Chemical Abstracts 78, No. 7, 41911b (Feb. 19, 1973)

6.14

CHANGES IN THE DEGREE OF RANCIDITY OF FATS IN FISH MEAL UNDER INDUSTRIAL CONDITIONS BY THE EFFECT OF ANTIOXIDANTS

Witas, Tadeusz (Szczecin, Poland)
Chemical Abstracts 78, No. 9, 56705m (Mar. 5, 1973)

6.1

zinc, iron, and cobalt present in the lipid phase of the meal were probably complexed and bound by the phospholipids. The selenium found in the lipid phase (0.3 to 3 p.p.m.) indicated that lipid-soluble selenium compounds do not decompose during the production of fish meal.
[2 tables, 12 references]

SW

4.9 (0.4)

many of the rats showed unspecific focal myocarditis and focal fibrosis. The incidence of severe focal fibrosis was greatest for those rats fed corn oil, followed by those fed cottonseed oil, soybean oil, olive oil, beef fat, saturated medium chain triglycerides, butter, chicken fat, and lard. When aerated fat was fed the rats, six of the eight fats promoted increased incidence of focal fibrosis. The W/Fu rats showed lower incidence of focal fibrosis; but those rats fed soybean oil had more than those fed lard, and aeration of the fats led to higher incidence. Many of the livers of the rats showed lesions of the bile ducts; the groups fed cottonseed, soybean, olive, and corn oils had the highest incidences of severe lesions, and use of oxidized oils led to a still higher incidence. The long-term degenerative nutritional effects do not appear to be associated with the fatty acid composition of the fats; perhaps the effects may be due to minor constituents in the individual fats.
[1 figure, 5 tables, 18 references]

FTP

6.159 (6.14)

EFFECT OF CURING TREATMENT AND STORAGE ON THE PROTEIN QUALITY OF FISH MEAL

Wessels, J. P. H. (Fac. Agric., Univ. Natal, Pietermaritzburg, South Africa)
Chemical Abstracts 78, No. 7, 41832b (Feb. 19, 1973)

4.82

ANIMAL AND VEGETABLE FATS IN MILK REPLACERS FOR VEAL CALVES. 5. FATTY ACID PATTERNS IN VARIOUS ADIPOSE TISSUES

Veen, W. A. G. (Stichting C.L.O.-Inst. Veevoeding "De Schothorst," Hoogland, Netherlands)
Chemical Abstracts 77, No. 25, 163371a (Dec. 18, 1972)

6.81 HISTOLOGY OF THE MANTLE AND PEARL SAC OF THE PEARL OYSTER PINCTADA MAXIMA (LAMELLIBRANCHIA)

Dix, Trevor G. (James Cook University of North Queensland, Townsville, Queensland, Australia)
Journal of the Malacological Society of Australia 2, No. 4, 365-375 (Mar. 31, 1973)
Address: Journal Treasurer, Malacological Society of Australia, c/o Dr. B. J. Smith, National Museum of Victoria, Russell St., Melbourne, Victoria, 3000, Australia.

The mantle of the pearl oyster is important in pearl culture since a required small mantle transplant together with a spherical pearl nucleus (or seed) are inserted into the visceral tissue of the host pearl oyster in the seeding procedure. The preferred response of the oyster is the proliferation of the transplanted mantle tissue to form a pearl sac which secretes concentric layers of nacre around the pearl nucleus to produce a gem quality pearl. In many cases, gem quality pearls are not formed. Other hazards of the industry are the death of the host pearl oyster shortly after the transplant operation and formation of irregular shaped pearls. In some pearl oysters, only an organic layer, or other low-value shaped specimens may be formed. In view of the mishaps that can adversely affect the pearl oyster, studies were undertaken to elucidate the normal mantle processes and the response of the pearl oyster to transplanted mantle, to wounds, and to changes occurring in transplanted mantle tissue.

The findings of the investigation suggest that most of the structural differentiation of the mantle may be related to function; that is, the functions of

8.42 (9.19) MERCURY IN SEALS FROM EASTERN CANADA

Sergeant, D. E. (Fisheries Research Board of Canada, Arctic Biological Station, Ste. Anne de Bellevue, Quebec, Canada), and F. A. J. Armstrong (Fisheries Research Board of Canada, Freshwater Institute, Winnipeg, Manitoba, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 6, 843-846 (June 1973)

This article reports on the mercury content of the tissues of four species of seals (having different migratory patterns and feeding ecology) from individual localities in Eastern Canada. Some of the data were summarized or extracted and placed in the table that follows. The livers had the highest levels of mercury (usually 1-100 p.p.m., but up to 387 p.p.m.) and the blubber had the lowest. The mercury content of the tissues of the seals increased with the age of the animal and appeared to vary with the position in the marine food web of the organisms that they eat. The harp seals (which feed on small pelagic fish and crustaceans) showed one order of magnitude less mercury content in the tissues than did the gray and harbor seals (which feed on large pelagic and benthic fish and cephalopods). However, other factors may enter in such as the mercury levels of the waters in which the seals reside.

7.0 HANDBOOK OF CHROMATOGRAPHY

Zweig, Gunter, and Joseph Sherma (editors)
CRC Press, Cleveland, Ohio (1972), Vol. I, 784 pp., $35.00; Vol. II, 343 pp., $19.95
Thomas Wolf and John H. Callahan (Colgate-Palmolive Co., 909 River Road, Piscataway, NJ 08854) (reviewers)
Journal of the American Oil Chemists' Society 50, No. 6, 233A (June 1973)

The handbook contains information from the four branches of chromatography. Volume I contains an index of over 12,000 compounds and 546 tables of retention data obtained by gas (GC), liquid (LC), paper (PC), and thin layer (TLC) chromatographies. The tables on GC and LC compare separations on different packings and give column dimensions, temperatures, flow rates, and detectors used for each. Also, for PC and TLC, type of paper or adsorbent, solvent system, and visualization techniques are listed.

Volume II contains a working description of the four chromatographic methods and a discussion of sample isolation and derivative formation under 24 class headings. In addition, it contains a directory of books on chromatography. The reviewers believe that both volumes are worthwhile as sources of reference to the subject. FTP

8.42 (0.35)(9.13) CADMIUM UPTAKE BY FIDDLER CRABS EXPOSED TO TEMPERATURE AND SALINITY STRESS

O'Hara, James (Belle W. Baruch Coastal Research Institute, University of South Carolina, Columbia, SC 29208)
Journal of the Fisheries Research Board of Canada 30, No. 6, 846-848 (June 1973)

Adult fiddler crabs, Uca pugilator, were exposed to various temperature and salinity regimes and 10 p.p.m. of Cd^{++} in order to determine the influence of temperature-salinity interaction on rate of uptake and translocation of cadmium within the tissues. The temperature-salinity regimes included 10° C. and 10 ‰ salinity; 10° C. and 30 ‰ salinity; 25° C. and 10 ‰ salinity; 25° C. and 30 ‰ salinity; 33° C. and 10 ‰ salinity; and 33° C. and 30 ‰ salinity. The crabs were exposed to the Cd^{++} (as $CdCl_2$) for 72 hr. At the end of 24, 48, and 72 hr. exposure periods, the animals were sacrificed, and their gills and hepatopancreas were removed and analyzed for cadmium content.

At each temperature (10°, 25°, and 33° C.), crabs in low salinity water accumulated higher levels of cadmium than did those exposed to high salinity water. This effect was probably due to the osmotic stress associated with the different salinity levels of the environment. Temperature of the environment had relatively slight effect on the accumulation of cadmium in the gills at high salinity, but it did have a strong effect at low salinity. Probably the greater metabolic activity at higher temperatures increases the rate of active uptake of salts by the fiddler crabs. Some of the data on the cadmium content of the gill and hepatopancreas from the fiddler crabs exposed to 10 p.p.m. cadmium over a 72-hr. period under different temperature-salinity regimes are shown in the table that follows.

7.461 RAPID METHOD FOR THE ROUTINE DETERMINATION OF SODIUM CHLORIDE IN FOODS IN GENERAL AND FISH PRODUCTS IN PARTICULAR

Monselise, J. J. (Lab. Assis Ltd., Ramat Gan, Israel)
Chemical Abstracts 78, No. 7, 41674b (Feb. 19, 1973)

8.42 (0.35)9.13)

Environmental regime of the fiddler crabs		Cadmium (Cd^{++}) content of the tissues of the fiddler crabs exposed to 10 p.p.m. cadmium over a 72-hr. period				
Temperature	Salinity	Total amount in the gill and hepatopancreas	Relative amount		Concentration	
			In the gill	In the hepatopancreas	In the gill	In the hepatopancreas
°C.	‰	µg.	%	%	p.p.m.	p.p.m.
10	10	1.86	29.9	70.1	25.1±3.7	30.1±2.2
10	30	0.75	38.6	61.4	10.2±0.8	6.5±2.9
25	10	8.65	19.9	80.1	70.8±8.8	133.8±30.2
25	30	1.85	20.2	79.8	15.5±1.1	33.7±6.3
33	10	17.44	16.2	83.8	92.0±15.1	200.2±22.1
33	30	4.9	11.3	88.7	24.1±3.5	77.5±13.1

Note: The author's table also included pertinent data at periods of 24 and 48 hr.

[1 table, 11 references] FTP

7.463 APPLICATION OF THE FLUORIDE ELECTRODE METHOD ANALYSIS OF ENVIRONMENTAL AND BIOLOGICAL SAMPLES. 2. ANALYSIS OF BIOLOGICAL SPECIMENS AND SOIL

Kondo, Takeshi (Dep. Hyg., Tokyo Dent. Coll., Tokyo, Japan)
Chemical Abstracts 78, No. 9, 54983b (Mar. 5, 1973)

6.81

the inner, middle, and shell folds of the mantle primarily are muscular, sensory, and secretory, respectively. The tall, stratified, columnar nonciliated, nonpigmented epithelium on the shell (or outer) fold secretes part of the periostracum (or lining) of the pearl sac and the inner, calcarious layer of the shell. A single layer of ciliated, columnar epithelium, with pigmented cells, covered the largest fold of the inner mantle. Cells of the middle mantle epithelium near the fold of the inner mantle were similar, but the remainder were nonpigmented with lightly basophilic cytoplasm. The author suggests that under abnormal conditions cells in the mantle folds may secrete periostracum rather than nacre; the result is the production of nongem quality pearls or other growths.
[17 figures, 19 references] SW

8.42 (9.19)

Species of seal Locality Age range Number of samples	Mercury concentration in the tissues							
	Blubber		Muscle		Liver		Hair	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
	p.p.m.	p.p.m.	p.p.m.	p.p.m.	p.p.m.	p.p.m.	p.p.m.	p.p.m.
Gray seal Sable Island Pup to 25 years 11 seals	0.02-0.16	0.08	0.17-2.35	1.13	0.46-387.0	88.2	--	--
Harbor seal Sable Island 1 to 8 years 8 seals	0.02-0.09	0.04	0.31-0.75	0.71	2.14-21.7	8.86	0.75-3.80	1.56
Hood seal Magdalen Island, Quebec 8 to 13 years 3 seals	0.08[1]	(0.08)[1]	0.62-1.93	1.21	27.2-45.2	37.2	2.64-7.63	5.06
Harp seal Escoumins, Quebec 1 to 18 years 20 seals	0.02-0.05	0.03	0.16-0.50	0.38	0.84-10.00	3.63	--	--

[1] One sample of blubber reported; therefore, one value.

[2 tables, 8 references] FTP

8.42 MOLYBDENUM CONCENTRATIONS IN TISSUES OF RAINBOW TROUT (SALMO GAIRDNERI) AND KOKANEE SALMON (ONCORHYNCHUS NERKA) FROM WATERS DIFFERING WIDELY IN MOLYBDENUM CONTENT

Ward, James V. (Dept. of Environmental, Population, and Organismic Biology, University of Colorado, Boulder, CO 80302)
Journal of the Fisheries Research Board of Canada 30, No. 6, 841-842 (June 1973)

The molybdenum content of rainbow trout and kokanee salmon is shown in the table that follows. The molybdenum levels in these fish are far less than those found by other workers in mammals. This difference may be due to the well-developed osmoregulatory system of the fishes.

9.0 (1.88) EXPOSE SYNOPTIQUE DES DONNÈES BIOLOGIQUES SUR LA MOULE MYTILUS GALLOPROVINCIALIS (LAMARCK 1819) (ATLANTIQUE ET MÉDITERRANÉE)
[SYNPOSIS OF BIOLOGICAL DATA ON THE MUSSEL MYTILUS GALLOPROVINCIALIS (LAMARCK 1819) (ATLANTIC AND MEDITERRANEAN)]

Lubet, Pierre (Université de Caen, Caen, France)
FAO Fisheries FIR/S No. 88, Food and Agriculture Organization of the United Nations, Rome, Italy (Jan. 1973), iv + 38 pp. [Distribution restricted]

This synopsis gives information on the identity, distribution, biology, population, exploitations, and management of the mussel M. galloprovincialis.
[87 references] FTP

9.1 MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. ANNELIDA: OLIGOCHAETA

Cook, David G. (National Museum of Natural Science, Ottawa, Canada), and Ralph O. Brinkhurst (Dept. of Zoology, University of Toronoto, Toronto 5, Ontario, Canada)
NOAA TR NMFS CIRC-374, National Marine Fisheries Services, U.S. Dept. of Commerce, Seattle, Wash. (May 1973), 23 pp. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price $0.35.

The manual includes an introduction on the general biology, an illustrated key, an annotated systematic list, a selected bibliography, and an index to the marine Oligochaeta of the East Coast of North America. The Families Naididae, Tubificidae, Enchytraeidae, and Megascolecidae are treated.

Publication of this circular is most timely in view of the growing universal emphasis on environmental work and the urgent need for more precise and complete identification of coastal organisms than has been available. It is mandatory, wherever possible, that organisms be identified accurately to species. Accurate, scientific names unlock the great quantities of biological information stored in libraries, obviate duplication of research already done, and make possible prediction of attributes of organisms that have been inadequately studied.

Extracted

9.10 A GUIDE TO THE MEASUREMENT OF MARINE PRIMARY PRODUCTION UNDER SOME SPECIAL CONDITIONS

Prepared by the Special Committee on Oceanographic Research Working Group No. 24, UNESCO, Paris, France (1973), 73 pp. Price $3.00, f1, frl2. Available from UNESCO sales agents.

This monograph deals with the most practical methods for estimating primary production under special conditions (such as those beneath polar ice and the turbid conditions in estuaries, polluted waters, and exceptionally eutrophic and oligotrophic waters). Suggestions are made as to ways in which the original carbon-14 technique can be modified to meet the special conditions existing in some marine environments. The manual stresses the practical methods rather than the theoretical aspects. FTP

9.0 (9.7) MANUAL OF FISHERIES SCIENCE. PART 1. AN INTRODUCTION TO FISHERIES SCIENCE

Kesteven, G. L. (Fishery Research and Development Project, Apartado Postal M-10778, Mexico)
FAO Fisheries Technical Paper No. 118, Food and Agriculture Organization of the United Nations, Rome, Italy (Feb. 1973), 43 pp. (Distribution restricted)

This technical paper is one in the series of FAO Manuals in Fisheries Science. It is based on the lectures given by the author mostly at the FAO/DANIDA Training Center in the Methodology of Fishery Science (Biology) in Frederikshavn, Denmark. This article is a draft version and is intended for use at FAO training centers and in FAO field projects. Eventually it will be revised and published in the official languages of FAO. The subject matter covered in the paper is: "Fisheries Science as Part of Science," "The Systems Studied by Fisheries Scientists," "Strategies and Programmes of Research in Fisheries Science," and "Applications of the Results of Fisheries Science."
[9 figures, 5 tables, 8 references] FTP

9.11 SALTS IN THE SEA

Degens, Egon T. (Dept. of Chemistry, Woods Hole Oceanographic Institution, Woods Hole, Mass.)
Nature 243, No. 5409, 504-507 (June 29, 1973)

Using data on chemical analyses of hydrothermal fluids from the East African region (primarily Lake Kivu), the author speculates on the kind and quantity of salts that have been discharged from the oceanic lithosphere to the sea during geologic times. The author believes that the waters of the East African rift have received their salts under geological conditions similar to those that exist when waters are released to the sea along oceanic rifts and that this process was the same during early stages in the development of the Earth's crust.

Sea water started out as a carbonate solution rich in magnesium; by a series of mineral equilibria, it gradually developed to a sodium chloride dominance. The excess in CO_2 was removed by the deposition of carbonate and by inorganic and biological reduction of CO_2. The steady state conditions were probably established at the end of the Precambrian era, at which time organisms began to develop a carbonate shell.
[1 figure, 3 tables, 25 references] FTP

8.42

Sample	Molybdenum (Mo) content of sample on wet basis			
	Rainbow trout (S. gairdneri)			Kokanee salmon (O. nerka)
	From water with trace Mo content	From water with 6 ppb Mo content	From water with 300 ppb Mo content [1]	From water with 300 ppb Mo content [2]
	ppb [3]	ppb	ppb	ppb
Whole fish	43	--	85	--
Liver	110	41	223	100
Spleen	48	92	208	85
Kidney	108	113	147	124
Skin	71	70	99	43
Bone	118	146	224	339
Muscle	10	10	13	14
Intestine	67	61	134	49
Stomach	47	35	332	228
Brain	21	17	92	34

[1] Four fish in sample.
[2] Twelve fish in sample.
[3] ppb = parts per billion.

[1 table, 2 references] FTP

9.1 (1.89) ACANTHASTER AGGREGATIONS: INTERPRETED AS PRIMARILY RESPONSES TO NATURAL PHENOMENA

Dana, T. F., W. A. Newman, and E. W. Fager (Scripps Inst. Oceanogr., La Jolla, CA 92037)
Pac. Sci., 26, No. 4, 355-372 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 3, Abstract No. 3Q2587M, 122 (Mar. 1973)

The 1969 Westinghouse Acanthaster survey provided a basis for studying large groups of A. planci on coral reefs in the Pacific Ocean. Although abundance was variable, large numbers of the starfish were most frequently found on leaward seaward reefs, on areas of moderate to luxuriant coral growth, and in waters less than 18.3 m. deep. The most significant environmental factor is that the position of the starfish on the reefs is related to trade-wind direction. Population studies indicate that large aggregations of the starfish have grown in a normal manner, and few of the reported infestations meet the published criteria defining an infestation. The authors theorize that large aggregations are redistributions of existing populations due to food limitations. They further believe that typhoons are the principle causative agents of the food limitations, and they present the A. planci density estimates in relation to typhoon frequencies to support their view. SW

9.12 CORRELATIONS BETWEEN SEASONAL RIVER DISCHARGE AND LOCAL LANDINGS OF AMERICAN LOBSTER (HOMARUS AMERICANUS) AND ATLANTIC HALIBUT (HIPPOGLOSSUS HIPPOGLOSSUS) IN THE GULF OF ST. LAWRENCE

Sutcliffe, W. H., Jr. (Fisheries Research Board of Canada, Marine Ecology Laboratory, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 6, 856-859 (June 1973)

The author found positive correlations between the monthly discharge of water of the St. Lawrence River and the annual regional catch of the American lobster and the Atlantic halibut. The lag period for lobster was 9 years and that for halibut was 10 years. These lag periods (to account for age at maturity or commercial size) permitted the author to make predictions on the supply of these species in the region involved.
[4 figures, 6 references] FTP

9.12 CROWN-OF-THORNS IN THE RED SEA
(1.89)

Nisbett, Alec
New Scientist 58, No. 841, 74-76, 78 (Apr. 12, 1973)

Predations of coral reefs by large numbers of crown-of-thorns starfish have caused concern throughout the world. The questions that were raised are: What causes plagues of the starfish like those in the Pacific Ocean? and What stops them? A British study unit, the Cambridge Coral Starfish Research Group, working in the Red Sea has discovered the factors that hold the starfish population in balance. The Group's first lines of inquiry into the triton shellfish and the painted shrimp as predators proved that neither of these could control the population of the starfish. In addition, the influence of pollution had no effect on population buildup.

The researchers discovered that a substance given off by a feeding starfish attracts other starfish; they tend to move toward feeding starfish rather than unpredated coral. This information explains how groups of starfish form naturally. Such an aggregation can become very large because of the increased reproductive efficiency of a group. The females release large numbers of eggs which float among the plankton present until they are fertilized. The floating larvae feed on the plankton until they settle. If they settle on live coral they will be consumed by the polyps; the author suggests that more starfish are eaten by corals than corals eaten by starfish. Starfish larvae that survive enter the holes of dead corals where they metamorphose to the adult stage.

9.12 WOOD-BORING BIVALVES, OPPORTUNISTIC SPECIES IN THE DEEP SEA

Turner, Ruth D. (Museum of Comparative Zoology, Harvard University, Cambridge, MA 02138)
Science 180, No. 4093, 1377-1379 (June 29, 1973)

During a dive of the D.S.R.V. Alvin (a small deep-sea submersible operated by the Woods Hole Oceanographic Institution) on June 14, 1972, small panels of wood were pushed into the bottom sediment at a depth of 1,830 m., about 180 km. south of Woods Hole, Mass. One hundred and four days later, two panels were removed by use of the mechanical arm of the submersible. The wood was so weakened by two species of bivalve wood borers (subfamily Xylophagainae, family Pholadidae) that it began to fall apart when being picked up by the arm of the Alvin. The two species of wood borers present were Xylophaga n.sp. and Xyloredo ingolfia. The author states that the high reproductive rate, high population density, rapid growth, early maturity, and utilization of a transient habitat of these wood borers classify them as opportunistic species, the first recorded from the deep sea.

The Xylophagainae use wood as a substrate and for food (as host organisms for symbiotic bacteria in the gut or by means of endogenous cellulase). The author believes that they are apparently the most important deep-sea organisms involved in decomposing woody plant material in the deep sea to available food sources as (1) fecal pellets for detritus feeders, (2) as larvae or adults for predators, and (3) as dead remains for scavengers.
[3 figures, 1 table, 27 references] FTP

9.12 MENHADEN TAGGING AND RECOVERY: PART I--FIELD METHODS FOR TAGGING MENHADEN, GENUS BREVOORTIA

Pristas, Paul J. (National Marine Fisheries Service, NOAA, Gulf Coastal Fisheries Center, Panama City Laboratory, Panama City, FL 32401), and Thurman D. Willis
Marine Fisheries Review 35, Nos. 5-6, 31-35 (May-June 1973)

This paper describes the methods and equipment used to mark over 1 million menhaden, Brevoortia tyrannus and B. patronus, along the Atlantic and Gulf coasts of the United States from 1966-1971.
[12 figures, 7 references] Authors' abstract

9.12 (1.92) COMPARATIVE STUDIES ON THE SWIMMING BEHAVIOUR OF THE BLIND CAVE FISH AND THE GOLDFISH

Yasuda, Kunio (Kyoto University, Kyoto, Japan)
Comparative Biochemistry and Physiology 45, No. 2A, 515-527 (June 1, 1973)

The swimming speed and patterns of swimming tracks of blind cave fish (Amblyopsis speloes) and artificially blind goldfish (Carassius auratus) were studied at various temperatures in still water. In order to exclude some environmental factors affecting fish behavior, blind fish were used.

Observations were reported on the behavior of the blind cave fish as follows. This fish is tropical, and normally is kept at the temperature range of 26°-30° C. Below 10° C., they did not move; they began to swim at about 13° C. At 15° C., most of the fish swam at a speed of 100 cm. per 15 sec.; at 30° C., most of them swam at a speed of 170 cm. per sec. There were two groups of fish with different behavior patterns. Fishes in the first group swam along the side walls of the aquarium and rarely near the center. Fishes in the second group swam throughout the aquarium and never along the side walls. This group had irregular ability to find food and grew slowly. Fish in the first group found food more quickly and grew faster.

The normal goldfish swam actively at 25° C. and became inactive below 20° C. The artificially blinded goldfish swam at higher speeds than the sighted goldfish. The behavior pattern of the blind goldfish became similar to that of the blind cave fish. [15 figures, 19 references]

SW

9.12 (1.33) DISTRIBUTION AND DIRECTION OF MOVEMENT OF COHO SALMON AT EARLY STAGE OF SPAWNING MIGRATION IN THE NORTHWESTERN NORTH PACIFIC OCEAN

Machidori, Seiji
Bulletin Far East Fisheries Research Laboratory No. 6, 95-100 (July 1972) (Shimizu 424, Japan)

The season of the Japanese high seas salmon fisheries begins in May and ends in July or August. In May and June there are a few coho salmon taken. The author suggests that the small coho catch at this time indicates that the species is present but is outside the commercial fishing area. In July and August the coho salmon becomes the major species caught. Using information gained from longline fishing and surface gill-netting operations in waters south of the commercial fishing area from off the coast of Hokkaido to 175° W., the author made a survey of coho distribution in June and early July. He found a wide distribution of coho salmon from west to east in the area bounded by 41° N. to 47° N. and 163° E. to 175° W. (This area begins about 5° S. of the Aleutian Islands and the tip of the Kamchatka Peninsula which are located at about 50° N.). Coho salmon were found in waters of surface temperatures ranging between 6° to 11° C., but there were more fish caught in waters at 8° to 10° C. The author suggested that the coho salmon were restricted by the temperature to warmer southern waters at the time--June and early July. In mid-July, 168 coho salmon were taken and tagged between 42° N. and 46° N. and between 170° E. and 175° W. Of these tagged individuals, 13 were recovered by Japanese fishermen in the area between 45° N. and 49° N. and between 165° E. and 174° E. The coho salmon were calculated to be moving northwestward at an average rate of travel of 13.2 miles per day.
[3 figures, 1 table, 8 references]

SW

9.12 MENHADEN TAGGING AND RECOVERY: PART II--RECOVERY OF INTERNAL FERROMAGNETIC TAGS USED TO MARK MENHADEN, GENUS BREVOORTIA

Parker, R. O., Jr. (National Marine Fisheries Service, NOAA, Atlantic Estuarine Fisheries Center, Beaufort, NC 28516)
Marine Fisheries Review 35, Nos. 5-6, 36-39 (May-June 1973)

Plate and rotating grate magnets installed in various locations in reduction plants effectively recover internal ferromagnetic tags used to mark menhaden. Tag recovery efficiency rates for large (adult) tags range from 14 to 97 percent with a mean of 64 percent and for small (juvenile) tags range from 5 to 86 percent with a mean of 39 percent. Magnet installations do not interfere with the reduction operation, but facilitate it by removing scrap metal.
[7 figures, 10 references]

Author's abstract

9.12 (1.89)

Further studies of the group showed that the starfish population is held in check by two predators: the trigger fish and the puffer fish. The author concluded that complete eradication of starfish aggregations is not necessary because the population will be reduced naturally by the predators; he also cautions that the predators of the starfish should be protected by conservation methods.
[3 illustrations]

SW

9.14 (1.85) FOOD COMPOSITION FOR SHRIMP

Shigeno, Kunihiko, Kazumi Kumada, Osamu Deshimaru, Takayuki Aramaki, Katsunobu Kuroki, and Kazua Kitaue (Prefecture Locale Autonome de Kagoshima-Ken) (pat.)
French Demande 2,121,733 (Sept. 29, 1972)
Chemical Abstracts 78, No. 23, 146519h (June 11, 1973)

9.15 BRANCHIOMYCOSIS: A NEW FUNGAL DISEASE OF NORTH AMERICAN FISHES

Meyer, Fred P. (Bureau of Sport Fisheries and Wildlife, Fish Farming Experimental Station, Stuttgart, AR 72160), and Jordan A. Robinson (McGehee, AR 71654)
Progressive Fish-Culturist 35, No. 2, 74-77 (Apr. 1973)

Branchiomycosis, a gill disease caused by fungi of the genus Branchiomyces, is considered a major problem in European commercial fish production. Epizootics develop rapidly and mortality rates are high. The loss of 50 percent of an infected population of Siluris glanis in 4 to 8 days was reported. A 100 percent loss of Coregonus albula when they were stocked in rearing ponds with infected carp was also reported. In Italy, 20 to 50 tons of Alburnus alborella were reported killed by Branchiomyces in Lake Lugano during 1970. Branchiomyces has been reported only from the European countries of Germany, Poland, Czechoslovakia, U.S.S.R., Italy, and Hungary. Prior to this report, it has not been described from fish in North America.

Branchiomyces produces the external signs of disease generally identified as "gill rot." Affected tissues lose their bright red color due to impaired circulation. As the infection spreads, diseased gill tissue becomes necrotic and assumes a white or brownish color. Necrotic tissue sloughs away, often leaving gill arches with sizable denuded areas. Infected fish usually are listless, exhibit signs of anoxia, lose their equilibrium, and die.

This paper reports the outbreaks of branchiomycosis in Arkansas that occurred only during hot weather. The affected pond had a long history of use for fish culture and contained heavy deposits of organic matter. Water temperatures at the

9.16 (0.5) EXPERIMENTAL OYSTER TRANSPLANTING IN LOUISIANA

Tarver, Johnnie W., and Ronald J. Dugas
Technical Bulletin No. 7, Louisiana Wild Life and Fisheries Commission, Oyster, Water Bottoms and Seafoods Division, New Orleans, La. (Mar. 1973), 10 pp. Price not given.

This report is an account of the experimental transfer of oysters from the eastern portion of Lake Pontchartrain and in Lake St. Catherine (polluted areas) to oyster lease areas where the oysters were allowed to depurate for a period of time until they were safe for human consumption. Information is given on the methods and procedures, including costs and accounts, of the successful operation. This report was issued to help other public service decision makers who may be faced with a similar situation.
[3 figures, 5 references] FTP

9.15 MICROBIAL DEGRADATION OF THE LAMPREY LARVICIDE 3-TRIFLUOROMETHYL-4-NITROPHENOL IN SEDIMENT-WATER SYSTEMS

Kempe, Lloyd L. (Fish and Wildlife Service, U.S. Dept. of the Interior, Ann Arbor, MI 48104)
Technical Report No. 18 (Jan. 1973), 16 pp. Obtainable from Great Lakes Fishery Commission, 1451 Green Road, P.O. Box 640, Ann Arbor, Mich. Price not given.

The sea lamprey is controlled in the Great Lakes by the application of the sodium salt of 3-trifluoromethyl-4-nitrophenol (TFM), a selective larvicide, in tributary streams at a concentration of 1 to 6 µg. per milliliter. Most of the TFM leaves the streams within a few days. An investigation to determine the ultimate disposition of the larvicide was performed.

Mixtures of TFM, water, and sediment were incubated at 22° C. The TFM decreased progressively in the mixture and disappeared in 1 to 4 weeks; in addition, the concentrations of the fluoride ion increased and the mixture became nontoxic for sea lamprey larvae and goldfish. If the TFM degradation process stopped, the process resumed upon the addition of nutrient broth to the mixture. Loss of TFM could be prevented by the addition of an antiseptic, such as phenol, or by heat sterilization. Microorganisms isolated from streams and sediments degraded TFM added to nutrient broth. The author concluded that the larvicide is degraded by the microflora inhabiting the sediment water systems.
[7 figures, 8 references] SW

9.16 (9.6) AQUACULTURE: THE FARMING AND HUSBANDRY OF FRESHWATER AND MARINE ORGANISMS

Bardach, John E., John H. Ryder, and William O. McLarney
John Wiley & Sons, Inc., 605 Third Ave., New York, NY 10016 (1972), 868 pp. Price $37.50.
Environmental Science & Technology 7, No. 5, 465 (May 1973)

This book describes, species by species, all the aquatic plants and animals that are cultivated for food in every part of the world. The methods of cultivation are also described together with the current and projected state of the art. The biology and ecology of the cultivated organisms are included. Yields and problems of aquaculture are discussed. SW

9.15 (9.12)(1.69) PARASITES AS INDICATORS OF ENGLISH SOLE (PAROPHRYS VETULUS) NURSERY GROUNDS

Olson, Robert E., and Ivan Pratt (Marine Science Center, Oregon State University, Newport, OR 97365)
Transactions of the American Fisheries Society 102, No. 2, 405-411 (Apr. 1973)

The extent to which English sole utilizes offshore nursery grounds during the first year of life is not known. Other investigators have used the presence of parasites to provide data on migrations of fish hosts. The objective of this study was to find parasites of juveniles that have life cycles operating only in an estuary and to use these parasites as tags indicating that the host fish had resided in the estuary. The English sole uses Yaquina Bay, Oreg., during a portion of its first year. Young of the first year appear in the bay in February, remain abundant from April to September, and then migrate to offshore areas in October. Examination of the sole collected from the bay and from offshore areas showed certain parasites that were acquired only in the bay. The parasite was Echinorhynchus lageniformis which proved useful in determining that the juvenile sole spent some time in the bay. The incidence of infection with the parasite in bay fish before migration (29.9%) was similar to incidence of infection in sole collected offshore after migration (28.5%). This result suggests that the young sole migrated from the bay to offshore waters, and that Oregon estuaries are the exclusive nursery grounds for this species. Two other parasites were considered to be indicators of residence of young sole in the upper estuary. These were the nematode Philometra americana and a microsporidan species that was classified in the genus Glugea.
[2 figures, 5 tables, 15 references] SW

9.16 (1.85) ECONOMIC FEASIBILITY OF FRESH WATER PRAWN FARMING IN HAWAII

Shang, Yung Cheng (University of Hawaii, Honolulu, Hawaii)
Bulletin published by the Economic Research Center, University of Hawaii, Honolulu, Hawaii (June 1972), 49 pp.

One of the most successful investigations into the intensive cultivation of aquatic animals was accomplished by the Fish and Game Division of the State of Hawaii with Malaysian prawn culture. This state unit imported 36 giant freshwater prawns (Machrobrachium rosenbergii) from Malaysia in 1965. After studies and rearing trials, a mass rearing technique was developed. The eggs of the prawn can be hatched and the young can be reared through their entire life cycle. The advantages of this species over other prawns are as follows: it is adaptable to a wide range of salinity; it is amenable to culture techniques; it breeds throughout the year; a large female can produce 80,000 eggs; the female carries and cares for the eggs which results in high hatching; it has a short larval life; it is a fast growing omnivore; and frozen freshwater prawn tastes better than saltwater shrimp.

The economic feasibility of prawn production was investigated, and the results are presented in six sections. The sections cover the method of evaluating investment worth, estimating costs, and measuring the economic worth of prawn farming. Prawn farming would be profitable for a 50-150 acre farm with prawn prices, at the farm, of $1.60-$2.00 per pound. The prospects of the industry depend on the market demand for prawn. But the large market for prawn will not mitigate the necessity for bringing the production costs down. For a new venture embarking on commercial prawn farming, it is essential that the operation be suspervised by a person specifically trained in the culture of prawns.
[6 figures, 17 tables, 4 references] SW

9.15

time the disease appeared were in the range of 30° to 35° C. The addition of well water (18° C.) temporarily slowed the rate of losses, but did not affect ultimate survival.

The B. sanguinis readily infects several species of fish and it is likely to infect other native fishes. Spores apparently survived winter conditions in Arkansas in pond water or bottom mud. The failure of European workers to control branchiomycosis strongly indicates that every effort should be made to prevent the spread of this fungus in the United States. Infected fish should be destroyed and ponds sterilized before draining. While in this instance drying may have eliminated the fungus from the contaminated pond, we believe that the European practice of chemical sterilization would be more dependable.
[3 figures, 16 references] Extracted

9.16 (9.17) EXPERIMENTS TO RE-ESTABLISH HISTORICAL OYSTER SEED GROUNDS AND TO CONTROL THE SOUTHERN OYSTER DRILL

Pollard, J. F.
Technical Bulletin No. 6, Louisiana Wild Life and Fisheries Commission, Oyster, Water Bottoms and Seafoods Division, New Orleans, La. (Jan. 1973), 82 pp. Price not given.

The purpose of this study was to obtain information on cultch planting programs and fresh-water diversion activities that would assist in the preservation, enhancement, and management of the public oyster seed grounds east of the Mississippi River. To obtain this information, biological and hydrological samplings were made in the subdelta bays and marshes east of the Mississippi River below New Orleans, La.

In planning a cultch planting, three main considerations are involved: the location of the planting, the timing of the planting, and the type of cultch. This study revealed that most of the public areas available for planting were infested by the southern oyster drill. Comprehensive data were obtained on area salinity and water temperatures which, when compiled with information on oyster drill occurrence, provided valuable insight for site selection for cultch planting and for achieving a desirable salinity regime by manipulation of fresh-water diversions. The peak periods of oyster set were bimodally May-June and August. Clamshell (valves of the brackish-water clam) is the favored type of cultch. Base line data were collected for proposed fresh-water diversions from the Mississippi River to depress the salinity regime of the area to control the southern oyster drill (and for other purposes).
[33 references and an appendix with 8 tables and 29 figures] FTP

9.15 (9.16) PREPARATION FOR PROPHYLAXIS AND MEDICAL TREATMENT OF EXTERNAL DISEASES OF FISH

Kol'gaev, A. M., and A. P. Ivanova (Pacific Ocean Scientific-Research Institute of Fishing and Oceanography) (pat.)
U.S.S.R. 364,322 (Dec. 28, 1972)
Chemical Abstracts 78, No. 26, 164092t (July 2, 1973)

9.16 SOME CHARACTERISTICS OF THE PARENT-PROGENY RELATIONSHIP IN THE DON PIKE-PERCH [LUCIOPERCA LUCIOPERCA (L.)]

Savel'yeva, E. A., and T. F. Shuvatova (Azov Fisheries Research Institute (AzNIIRKh), Rostov-on-Don, U.S.S.R.)
Journal of Ichthyology 12, No. 2, 241-248 (1972)

Many reports are avaiable to show that, in the majority of food fishes, the major mortality occurs in the early stages of life--the eggs and larvae. In addition, many investigators believe that the condition of the spawners influences the quality of their progeny and, consequently, their ability to survive. Experiments were carried out with groups of three sizes of fish to further elucidate this relationship.

Female and male fish were injected with pike-perch pituitary gonadotropic hormone. After egg laying and fertilization had taken place, the spawners were analyzed for length, age, and weight; the females were analyzed for fat content in muscle, liver, and gonads. The characteristics of the eggs were studied by measuring and weighing the larvae and weighing the yolks separately. Protein content of the embryos and larvae were determined; respiration rate of the larvae were also determined.

The results indicate that the shortest maturation period following pituitary injection was found in females of the middle sized group (42-47 cm.). This group had the highest content of trophic substances; that is, fat in the muscle and protein in the liver. The eggs from this group were highest in yolk reserves and protein content. A correlation was found between the age of the female spawner and the

9.17 THE AQUATIC ENVIRONMENT, FISHES AND FISHERY ROSS LAKE AND THE CANADIAN SKAGIT RIVER INTERIM REPORT VOLUME 1

Anonymous
City of Seattle, Dept. of Lighting, International Skagit-Ross Fishery Committee (Nov. 1972), 289 pp.

This report contains the results of investigations carried out by the agencies represented on the International Skagit-Ross Fishery Committee through the period of the 1971 field season. The report begins with a history of the Ross Lake development program and its status. The report continues with a description of the state of the environment relative to Ross Lake and the Skagit River and their tributary streams. A large section is given to the present state of fishes and the fishery with projections for its future. Projections for different stages of construction of the dam and their effects on the environment are described.
[62 figures, 59 tables, 37 references] SW

9.17 (1.0118) LAKE ERIE'S FISH COMMUNITY: 150 YEARS OF CULTURAL STRESSES

Regier, H. A. (University of Toronto, Toronto 5, Ontario, Canada), and W. L. Hartman (Bureau of Sport Fisheries and Wildlife, U.S. Dept. of the Interior, Sandusky, OH 44870)
Science 180, No. 4092, 1248-1255 (June 22, 1973)

In this review, the quality of the water in primeval Lake Erie is compared with current conditions in the lake: the ecological and cultural stresses are identified, the effects of the fishery and the other stresses on the lake's resources are considered, and resource management problems are described.

Lake Erie was "discovered" by Louis Joliet in 1669. The land draining into it supported large stands of hardwood and hemlock timber. Between the forests lay vast grasslands. Large marshes bordered parts of the lake, with the Great Black Swamp at the southwest corner. Runoff waters entering the lake were clear, soft, and free of nutrients; most lake water was clear throughout the year without blooms of algae. With the advent of civilization, the destruction of the forests, the burning of the grassland, and drainage of the swamps turned the adjacent land areas into rich farmlands. These changes reduced the spawning grounds; thus, the great quantity and variety of fish that depended on the primitive conditions of the lake could not be maintained. The present fish community consists mainly of yellow perch, white bass, channel catfish, drum, carp, goldfish, and rainbow smelt.

The ecological stresses on the lake are cultural and natural. The cultural stresses are the commercial fishery, eutrophication, introduction of nonindigenous aquatic species, shoreline construction and drainage, and pollution. The severity

9.19 CONTROL OF MERCURY CONTAMINATION IN FRESHWATER SEDIMENTS

Feick, George, Edward E. Johanson, and Donald S. Yeaple
Environmental Protection Technology Series EPA-R2-72-077 (Oct. 1972), ix + 156 pp. Price $2.00. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Methods for controlling the release of mercury from sediments were investigated and developed. The study indicated that the behavior and mobility of mercury in natural water and soil are controlled by the strong binding of the mercury ion to sediments, suspended particles, and soils. The mercury-binding capacity of sediment increases with the increase of organic matter in it. Oxidation of sediment, as exposing dredge spoil to air, or the presence of salt decreases its mercury-binding capacity. Sediments are less binding to the methylmercuric ion than to the mercuric ion. Since most sediments contain the mercuric form, binding the inorganic mercury in a form that is resistant to methylation would decrease the mobility of the contaminant. This reaction can be accomplished by the addition of long-chain alkyl thiols to bottom sediments. These additions are nontoxic to fish and prevent uptake of mercury by the fish through immobilization of the mercury in the sediment. The thiols may impart an objectionable odor or taste to the water. Mechanical dredging of mercury contaminated sediments may increase the local concentrations of waterborne mercury from less than 1 part per billion to 0.1 to 1.0 p.p.m. Less than 1% of the increase is water-soluble mercury; the remaining 99% is bound to particulate matter which will settle. The settling particulate matter will be readily ingested by bottom-feeding fish. Mercury contaminated dredge spoil in

9.17 (1.0118)

of the natural stresses may be compounded by the presence of the cultural stresses. The commercial fishery began after the War of 1812. From 1820 to 1890 the catches increased at the rate of 20% annually as better transportation opened up new markets, and fishing technology improved. Lake trout, lake herring, and lake whitefish were the targets of the gill net fishery between 1850 and 1860. Lake sturgeon interfered with this fishery; the fishermen emphasized destruction of sturgeon (during their fishing operations) and this population was rapidly reduced to commercial insignificance. With better fishing gear, the populations of lake trout, followed by whitefish and lake herring, were also reduced to insignificance. With the decline of commercial fishing, government agencies in Canada and the states bordering the lake were established to cope with the problem. Fish hatchery techniques developed in France were adapted to stocking the lake, but they were unsuccessful.

Pollution from metropolitan, agricultural, and industrial sources has been the cause of eutrophication. However, the final collapse of the remaining dominant fish populations was caused by predation by rainbow smelt, cannibalistic activity of blue pike, and predation by other fish. All of these factors were intensified by the fisheries. Eutrophication was not the dominant stress, and the invasion of the sea lampreys did not cause serious losses.

Some headway is being made by government agencies toward regulating interboundary sources of pollution that are harmful to water quality and fish habitat. The current fishery management objective is the conservation of existing valued species and the possible replacement of species that have been severely reduced.
[2 figures, 29 references] SW

9.16

fertilization rate of her eggs, and a close relationship was found between viability of embryos and fat content of the muscle tissue of the female. In addition, a correlation was found between the age of the female and the rate of yolk consumption during growth of and resulting weight gain of the embryo. The rate of metabolic process was found to be highest in embryos from spawners of the medium sized group. The authors recommended that females 42-60 cm. in length and males 38-46 cm. in length should be used for artificial propagation of pike-perch.
[6 tables, 19 references] SW

9.19 COPPER INDUCED LESIONS IN ESTUARINE TELEOSTS

Gardner, George R., and Gillies LaRoche (Natl. Mar. Water Qual. Lab., U.S. Environ. Prot. Agency, West Kingston, R.I.)
Chemical Abstracts 78, No. 23, 144093r (June 11, 1973)

9.19

landfill may release mercury because of oxidation and leaching. Proper landfill design will reduce percolation, and the addition of long-chain alkyl thiols will prevent methylation and subsequent release of mercury. When dredging of a mercury-contaminated site is required, provisions should be made prior to the operation for adequate land disposal of the dredge tailings.
[21 figures, 28 tables, 22 references] SW

9.19 DETERMINATION OF BIOCHEMICAL OXYGEN DEMAND IN BIOCHEMICALLY PURIFIED WASTE WATERS OF THE PYARNU FISHERY

Shifrin, S. M., E. V. Porkhal, and E. M. Gur'yanova (U.S.S.R.)
Chemical Abstracts 78, No. 22, 140114a (June 4, 1973)

9.19 DDT: AN UNRECOGNIZED SOURCE OF POLYCHLORINATED BIPHENYLS

Maugh, Thomas H., II
Science 180, No. 4086, 578-579 (May 11, 1973)

Polychlorinated biphenyls (PCBs) are industrial chemicals, but they are ubiquitous in the biosphere. They resemble DDT in this respect. The author reviewed reports which indicated that the similarity in distribution of DDT and PCBs is not accidental. Two researchers, K. W. Moilanen and D. G. Crosby, reported to the 165th meeting of the American Chemical Society at Davis, Calif., in April 1973, that DDT vapor can be converted to PCBs by the same wavelengths of ultraviolet (UV) light found in sunlight of the lower atmosphere. They found that DDT was converted slowly to DDD and much more rapidly to DDE. Further irradiation by UV converted DDE to no less than nine other products including several PCBs. Other workers, A. R. Mosier, W. D. Guenzi, and L. L. Miller [Science 164, 1083 (1969)] reported the photochemical decomposition of DDT but at UV wavelengths not found in the lower atmosphere. Microorganisms in the soil convert DDT to DDE and DDD. M. M. Cliath and W. F. Spencer reported [Environ. Sci. Technol. 6, 910 (1972)] that 80% of the organochlorine chemicals in the air above a field that had been sprayed with DDT and then plowed consisted of DDE which is available for further photochemical degradation. The author states that there is little evidence to indicate whether environmental PCBs are enriched by the addition of less chlorinated isomers that would result from the photodegradation of DDT. K. W. Moilanen and D. G. Crosby expect to continue investigating the photochemical degradation of DDT for further confirmation of their initial finding that DDT in the environment is the source of PCBs.
[1 figure, 4 references] SW

9.19 ESTABLISHING SAFETY OF FEED ADDITIVES USED FOR PRODUCTION ENHANCEMENT

Goatcher, W. D., M. J. Norvell, D. A. Gable, and R. D. Williams (Bureau of Veterinary Medicine, Food and Drug Administration, Rockville, Md.)
Feedstuffs 45, No. 21, 47, 70 (May 21, 1973)

In demonstrating human safety of new animal drugs and feed additives, determinations for the amount of residues in the animal must be performed. If the drug or additive leaves a residue in the animal, toxicological studies must be made to provide data on the following: the metabolic fate and tissue depletion rates for the drug and its metabolites, acute oral LD_{50} tests, subacute oral toxicity tests, chronic oral toxicity tests, three generation studies, carcinogenicity studies, teratogenicity studies, mutagenicity studies, allergenicity studies, and drug interactions and enzyme induction studies. These tests are performed to determine the effect and no-effect level in two species of animals--a rodent and a nonrodent.

In general, the studies used to yield data in support of animal safety are the same as those used to demonstrate safety in humans.

Chemicals used in animals for production purposes have a significant ecological impact because they are consumed and voided extensively and continuously. Under provisions of the National Environmental Policy Act of 1969, an ecological impact statement will be required for new animal drug and feed additive applications. The influence on the environment of residues from feed additives may be studied at one or more time periods and locations, because residues and breakdown products may

9.19 RESIDUES OF DDT AND ITS DEGRADATION PRODUCTS IN COD LIVER FROM TWO NORWEGIAN FJORDS

Stenersen, J. (Norwegian Plant Protection Institute, 1432 As-NLH, Norway), and J. Kvalvag (Chemical Research Laboratory, Norwegian College of Agriculture, 1432 As-NLH, Norway)
Bulletin of Environmental Contamination and Toxicology 8, No. 2, 120-121 (Aug. 1972)

This preliminary investigation was performed to determine if the use of DDT in agricultural operations results in residues in aquatic organisms. Cod were taken from a fjord bordered by intensive fruit production; and cod were taken from a fjord bordered by land where there was no fruit production. The livers of the fish were subjected to chromatographic techniques to determine the presence of DDT and its metabolites. The results indicate that the livers from cod caught in the fjord bordered by fruit production agriculture had 7.5 times more residues than livers from cod caught in the other fjord.
[1 figure, 1 table, 3 references] SW

9.19 METABOLISM OF DDT BY FRESH WATER DIATOMS

Miyazaki, S., and A. J. Thorsteinson (Dept. of Entomology, University of Manitoba, Winnipeg R3T 2N2, Canada)
Bulletin of Environmental Contamination and Toxicology 8, No. 2, 81-83 (Aug.1972)

Reports of other workers indicated that dechlorination of DDT was accomplished by the metabolic activity of a yeast, a fungus, several actinomycetes, bacteria, and a marine diatom. The possibility that diatoms detoxify DDT in aquatic environments was also suggested.

The authors investigated the ability of freshwater diatoms to degrade DDT to DDE. Pure cultures of diatoms were isolated from a sample of ditch water. The pure unidentified diatom cultures and cultures of Nitzschia species (a trematode parasite of fish) were placed in separate flasks containing nutrient medium and a radioisotope of ^{14}C-DDT. The flasks were incubated in a shaker water bath at 20°-22° C. for 2 weeks. At the end of the period the mixtures of diatoms and culture medium were extracted with an n-hexane and ether mixture and filtered. The residual cells were extracted with acetone, and the extracts were combined with the n-hexane-ether extracts. The concentrated extracts were subjected to thin-layer chromatography.

The results indicate that DDE was the only metabolite of DDT. Further, the unknown diatoms were active in degrading DDT to DDE and more active than Nitzschia species in this regard. The authors concluded that some species of freshwater diatoms may be significant in the natural degradation of DDT.
[1 table, 13 references] SW

9.19 (1.37) ORGANOCHLORINE INSECTICIDE, HERBICIDE AND POLYCHLORINATED BIPHENYL (PCB) INHIBITION OF NaK-ATPASE IN RAINBOW TROUT

Davis, Paul W. (Dept. of Pharmacology, University of Washington, Seattle, Wash.), Jacqueline M. Friedhoff, and Gary A. Wedemeyer
Bulletin of Environmental Contamination and Toxicology 8, No. 2, 69-72 (Aug. 1972)

Previous reports showed that organochlorine compounds inhibited the sodium and potassium ion-activated adenosinetriphosphatase (NaK-ATPase) in gill, brain, and kidney microsomes of rainbow trout. The authors examined the NaK-ATPase enzyme system in trout gill for toxic reactions to 14 chlorinated hydrocarbons, 2 PCBs, and 2 herbicides. NaK-ATPase activity was calculated as the difference between NaKMg-ATPase and Mg-ATPase values. The percent inhibition is shown in a table in the report listing all the compounds and the concentrations at which they were tested. The authors suggest that there are limits to relating in vitro enzyme inhibition to in vivo toxicity in fishes, and further studies of organopolychlor toxicity for the NaK-ATPase enzyme system should be interpreted with caution.
[1 table, 10 references] SW

9.19 METHYL MERCURY: ITS EFFECT ON EGGSHELL THICKNESS

Peakall, David B., and Jeffrey L. Lincer (Section of Ecology and Systematics, Cornell University, Ithaca, NY 14850)
Bulletin of Environmental Contamination and Toxicology 8, No. 2, 89-90 (Aug. 1972)

The eggshell thinning caused by DDT and its metabolites has been previously reported and is well known. The authors suggested that other widely dispersed materials, in appreciable concentration and capable of biological magnification (up the food chain), may also cause eggshell thinning. They selected mono- and dimethyl mercury for studies of effects on eggshell thinning. Eggs were collected from ring doves and American kestrels before and after they were exposed to the methyl mercuries. The shells of the dove's eggs were ashed rather than measured for thickness because they were small.

The results indicate that either form of methyl mercury had no effect on the eggshell thickness of the kestrels or the calcium content of the dove's eggs.
[1 table, 11 references]

SW

9.19 DESTRUCTION [sic] FISH CAUSED BY INDUSTRIAL POLLUTION

Rakaj, Ndoc (Inst. Stud. Proj. Ind., Univ. Shteteror, Tirana, Albania)
Chemical Abstracts 78, No. 23, 144024u (June 11, 1973)

9.19

vary with time and location. The characteristics of residues to be considered include: toxicity, rate of input into the environment, persistence, tendency to concentrate at points in the environment, rate of uptake in biological systems, and magnification in the food chain. The authors believe that an ideal ecological policy should restrict the use of drugs or additives which present a definite threat to the environment yet not prevent the use of those which enhance food production.

SW

9.19 DISTRIBUTION OF DISSOLVED MERCURY IN THE IRISH SEA

Gardner, D., and J. P. Riley (Dept. of Oceanography, University of Liverpool, Liverpool L69 3BX, England)
Nature 241, No. 5391, 526, 527 (Feb. 23, 1973)

During Sept.-Oct. 1972, a survey was carried out of the distribution pattern of dissolved mercury in the Irish Sea. Excluding the coastal strip about 40 km. wide extending northwards from Anglesey, the dissolved mercury level of the Irish Sea ranged from 25 to 50 (average 32) ng. l^{-1}, except for the central area which ranged from 10 to 24 (av. 18) ng. l^{-1}. These values are similar to those found for the English Channel, the northern North Sea, and the Northeast Atlantic. Two areas in the eastern coastal strip showed dissolved mercury concentrations over 200 ng. l^{-1}. Apparently, significant mercury pollution occurs in this area.
[2 figures, 10 references]

FTP

9.19 (1.51) ANALYSIS OF A CHLORINATED TERPHENYL (AROCLOR 5460) AND ITS DEPOSITION IN TISSUES OF COD (GADUS MORHUA)

Addison, R. F. (Fisheries Research Board of Canada, Bedford Institute, Dartmouth, Nova Scotia, Canada), G. L. Fletcher, S. Ray, and J. Doane
Bulletin of Environmental Contamination and Toxicology 8, No. 1, 52-60 (July 1972)

A chlorinated terphenyl (or triphenyl or polphyenyl) was fed to codfish to determine its distribution in the tissues of the fish. Samples of tissue were homogenized in n-hexane and filtered. The hexane layer was recovered, evaporated, and reconstituted; an aliquot was applied to a column containing previously treated Florisil. Elution of the column with n-hexane brought off the chlorinated terphenyl (Aroclor 5460), PCBs, and some pp'-DDE. The Aroclor 5460 was estimated by gas-liquid chromatography and a pulsed electron capture detector.

In one experiment, 2 ml. of a herring oil containing 1 g. of Aroclor 5460 were fed to mature cod. After 1 week, the fish were killed and the tissues were analyzed for Aroclor 5460. In another experiment, a group of cod were fed the herring oil with Aroclor 5460. They were fed chunks of herring intermittently and killed at the end of a 70-day period. The tissues of these fish were analyzed also.

The results of the analyses show that all tissues of fish killed 1 week after ingesting Aroclor 5460 contained the compound. High levels were found in digestive tract organs, but the levels varied between fish. In the fish analyzed after 70 days, all tissues contained Aroclor 5460, but the levels were lower than in the fish killed 1 week after ingesting the compound. The authors suggest that the absorptive and excretory efficiency seemed poor.
[1 figure, 2 tables, 11 references]

SW

9.19 ICELANDIC GEOTHERMAL ACTIVITY AND THE MERCURY OF THE GREENLAND ICECAP

Siegel, B. Z. (Dept. of Microbiology) and S. M. Siegel (Dept. of Botany, University of Hawaii, Honolulu, HI 96822), and F. Thorarinsson (Division of Geosciences, Science Institute, University of Iceland, Reykjavik, Iceland)
Nature 241, No. 5391, 526 (Feb. 23, 1973)

Studies were made of the levels of mercury in the atmosphere over Iceland; analysis for mercury was by flameless atomic absorption. The authors found that the levels of mercury in the atmosphere over Icealnd varied greatly according to the site, but that several widely separated locations yielded mercury concentrations well above the range commonly cited for unpolluted air (0.001-0.010 $\mu g.m^{-3}$). In the Krýsuvik thermal area, duplicate analyses on each of four separate sample traps yielded a mean value of 11.3 ± 1.8 $\mu g.\ m^{-3}$, and in the Westmann Islands area, five sites showed a mean mercury level of 2.4 ± 0.8 $\mu g.\ m^{-3}$. Although mercury may be introduced into the atmosphere by degassing of fluid magmas, the authors suggest that release from fine ash could also serve as a vehicle. Long-range transport of volcanic ejecta from Iceland eastward to Europe and parts of Asia and Africa has already been established. Effluents from Iceland to Greenland would be transported by prevailing winds and by North Atlantic gales (which are commonly associated with eastward moving cyclones and sustain a westerly circulation in their northern sectors).
[1 figure, 10 references]

FTP

9.19 HYDROCARBONS AND POLYCHLORINATED BIPHENYLS FROM THE UNSAPONIFIABLE FRACTION OF ANHYDROUS MILK FAT

Flanagan, Vincent P., and Aldo Ferretti (Dairy Products Laboratory, Agricultural Research Service, U.S. Dept. of Agriculture, Washington, DC 20250)
Journal of Lipid Research 14, No. 3, 306-311 (May 1973)

Previous studies have demonstrated the presence of hydrocarbons in milk fat and anhydrous butter oil. These compounds include the normal C_1 to C_{48} alkanes, some of their 2-methyl and 1-cyclohexyl derivatives, mono- and diolefins, branched-chain alkanes, alkynes, alkyl-substituted benzenes, and squalene. The purpose of the present study was to unequivocally establish the presence of hydrocarbons in the unsaponifiable fraction of anhydrous milk fat. The hydrocarbons were isolated and analyzed by GLC, and the column effluent was fast scanned with a mass spectrometer. Examination was also made for polychlorinated biphenyls.

The presence of 39 aliphatic hydrocarbons was firmly established in the unsaponifiable fraction of anhydrous milk fat. These were the C_{14} to C_{27} and the C_{29} to C_{31} straight-chain paraffins, their monoolefin analogs, and the C_{25} to C_{29} branched alkanes. Phytene, 3,7,11,15-tetramethyl-n-hexadec-2-ene, was isolated and identified by high-resolution mass spectrometry and infrared analysis. The hydrocarbon level in the milk fat amounted to 30 p.p.m. Polychlorinated biphenyls were also present in trace amounts and were detected in the area of the chromatogram between the C_{18} and C_{23} hydrocarbons.

The origin of the hydrocarbons in milk fat is not clear. Some of them may be heat produced, but the mechanism of their formation is not known.

9.19 GEOGRAPHIC DIFFERENCES IN PHYTOPLANKTON SENSITIVITY TO PCBs

Fisher, Nicholas S., Linda B. Graham, and Edward J. Carpenter (Biology Dept., Woods Hole Oceanographic Institution, Woods Hole, MA 02543), and Charles F. Wurster (Marine Sciences Research Center, State University of New York, Stony Brook, NY 11790)
Nature 241, No. 5391, 548-549 (Feb. 23, 1973)

Other researchers have postulated that organisms adapted to stable, "predictable" environments are, in general, more sensitive to environmental stress than are organisms adapted to "unpredictable" surroundings. Because experimental evidence for this hypothesis is lacking, the present authors studied the toxicity of PCBs to three species of diatoms. The clones of diatoms isolated from the relatively stable Sargasso Sea waters were compared with those isolated from fluctuating estuarine environments. The species of diatoms studied were Thalassiosira pseudonana, Fragilaria pinnata, and Bellerochia sp. For each clone, three cultures were grown in medium containing 10 parts per billion (p.p.b.) of PCBs (Aroclor 1254), and three cultures (controls) were grown in medium without PCBs. The cultures were sampled after 0, 47.5, 70, 95, and 118 hr. and measured for the growth of the clones. The data are shown in the table that follows. Growth of all seven clones diminished in the presence of PCBs, but the isolates from the Sargasso Sea were consistently more sensitive than those from the estuaries and the continental shelf. The authors suggest that the estuarine-coastal phytoplankton may be better equipped to survive abiotic environmental stress than are those from the open ocean.
[1 figure, 1 table, 15 references]

9.2 (1.0117)(1.85) A STOCHASTIC INVESTMENT MODEL FOR A SURVIVAL CONSCIOUS FISHING FIRM

Thompson, Russell G., Richard W. Callen, and Lawrence C. Wolken (Quantitative Management Science, University of Houston)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 112-120.

In this study, the stochastic investment model for a survival conscious firm developed by Thompson and George (1970) is extended to take into account income taxes and depreciation of the capacity. This model is applied to shrimp fishing on the Texas Gulf coast. Values of the parameters, as in the deterministic application by Thompson et al. (1970), were based on proprietory information, current market conditions, and present institutional restrictions. The effect of growth in real per capita income on shrimp prices is estimated, and two different rates of income growth are analyzed. Solutions to six problems based on two different sets of random sequences are computed and discussed. The results indicate the effect of the survival constraint on investment decisions, and the importance of revealed information in decision making.
[3 tables, 3 references, appendix] Authors' abstract

9.2 (1.85) THE U.S. SHRIMP INDUSTRY: PAST TRENDS AND PROSPECTS FOR THE 1970'S

Whitaker, Donald R. (Fishery Products Research and Inspection Division, NOAA, National Marine Fisheries Service, Washington, DC 20235)
Marine Fisheries Review 35, Nos. 5-6, 23-30 (May-June 1973)

The U.S. shrimp industry has expanded rapidly during the last two decades and is expected to continue growing during the 1970's. Production has grown in recent years because of rapidly increasing catches of northern shrimp. Total production likely will continue upward, but not as rapidly as in recent years. Most, if not all, of the increase will come from northern shrimp landings. Per capita consumption of shrimp has doubled. Total consumption of shrimp is expected to expand during the 1970's but whether it will expand at a faster rate than the population will depend on discoveries of new resources around the world. Demand for quality and demand for increased services are expected to rise.
[6 figures, 2 tables, 2 references] Author's abstract

9.19

Clones species source	Ratio of (cell density of treated culture): (cell density of control)				
	After 0 hr.	After 47.5 hr.	After 70 hr.	After 95 hr.	After 118 hr.
T. pseudonana					
Estuarine	1.00	0.694	0.365	0.676	0.976
Estuarine	1.00	0.544	0.368	0.520	0.844
Oceanic	1.00	0.422	0.241	0.172	0.341
F. pinnata					
Estuarine	1.00	0.824	0.909	0.932	0.590
Oceanic	1.00	0.688	0.707	0.269	0.387
Bellerochia sp.					
Estuarine	1.00	0.207	0.064	0.036	0.035
Oceanic	1.00	0.074	0.020	0.013	0.005

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The detection of PCB in milk fat was unexpected. Even though they were present in trace amount, the authors believe that their detection emphasizes the widespread contamination of our environment.
[3 figures, 18 references]

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Jernelov, Arne (Inst. Water Air Pollut. Res., Stockholm, Sweden)
Chemical Abstracts 78, No. 9, 53542v (Mar. 5, 1973)

9.19 MERCURY AND FOOD CHAINS

9.2 (1.0113)(1.30) AUGMENTATION OF SALMON STOCKS THROUGH ARTIFICIAL PROPAGATION: METHODS AND IMPLICATIONS

Stevens, Joe B. (Dept. of Agricultural Economics, Oregon State University, Corvallis, Oreg.), and Bruce W. Mattox (University of Rhode Island, Kingston, R.I.)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 133-145.

Eighty-one hatcheries on the Pacific Coast now rear significant numbers of salmon and steelhead for sport and commercial fisheries. Annual operation and maintenance costs amount to $6.6 million. A production function analysis of 15 Oregon Fish Commission hatcheries produced tentative conclusions that (a) controlled inputs were combined in fixed proportions, (b) constant returns to size were realized, and (c) some degree of factor substitution existed between the controlled "fixed proportion input" and water temperature. The latter relationship may allow hatchery managers to improve efficiency at the hatchery level. Uncertainty with respect to downstream environmental conditions, however, must be considered along with returns to size for the hatchery production function when new investments are undertaken.

Fixed asset theory was used to conceptualize exit and entry of salmon harvesting resources between 1947 and 1966. Net entry followed years of good catches, but net exit did not occur following the bad years. If a major objective of hatchery programs is to augment fishermen's incomes, consideration must be given to increasing the opportunity costs of extant resources as well as to limiting entry of new resources.
[4 figures, 5 tables, 13 references]

Authors' abstract

9.2 (9.3) ON THE UTILITY OF BIOECONOMIC MODELS FOR FISHERIES MANAGEMENT

Pontecorvo, Giulio (Graduate School of Business, Columbia University, New York, N.Y.)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 12-22.

Short run and long run biological and economic models are inevitably bound together in any comprehensive plan to manage commercial fisheries. While these disciplines can be treated rigorously, political and social considerations can be considered only generally and therefore on an ad hoc basis. Within this framework long run models are useful primarily for goal setting. More work must be done in developing short run models which will measure the immediate biological and economic impacts of alternative management steps in addition to immediate political and social ramifications. Emphasis would then be placed upon the economic sources of short run instability, with an initial economic rationalization of the fishery providing the funds for subsequent management and biological forecasting which will concentrate on extending management from a rationalized fishery at a given harvesting level to rationalized fishing at some optimum level.
[15 references]

Author's abstract

9.2 (1.013)(1.21) OPTIMAL FISHING EFFORT IN THE PERUVIAN ANCHOVETA FISHERY

Segura, Edilberto L. (Bailey, Tondu, Warwick and Company, Ltd., New York, N.Y.)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 57-64.

This paper introduces a new approach to measuring technical change, increased skills of the skipper and the fishermen, water temperature, etc., to obtain a better measure of fishing effort and therefore a revised estimate of the optimum quantity to be landed. The revised technique used adjusts the level of landings to an index rather than the level of fishing effort, indicating the level of landings that would have resulted in previous periods if the current landings/effort relationship is used.

The revised yield/effort relationship which results yields 16.2 million ton-trips as the optimal fishing effort, as opposed to the 23 million ton-trips which were obtained without this measure of technical change.

[3 figures, 1 table, 5 references] Author's abstract

9.2 (9.3) NATURAL RESOURCES AND EXTERNAL ECONOMICS: REGULATION OF THE PACIFIC HALIBUT FISHERY

Rich, Jack (Dept. of Economics, Oregon State University, Corvallis, Oreg.)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 65-71.

In a static, long run competitive equilibrium framework, a catch function allowing for short run diminishing returns is combined with a fish growth function developed by Pella and Tomlinson which facilitates the derivation of an expression for the long run marginal cost of "effort" in a common property resource such as a fishery. This expression takes into account both "congestion" and "growth" costs. The diagramatic technique of Crutchfield and Zellner is modified to take account of these externalities. The modified Crutchfield-Zellner diagrams are used to illustrate the potential economic losses from maximum sustainable yield regulation or other nonoptimal output.

[5 figures, 7 references] Author's abstract

9.2 (1.0154)(1.0120) LIMITED ENTRY: THE CASE OF THE JAPANESE TUNA FISHERY

Keen, E. A. (California State University, San Diego, CA 92115)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 146-158.

Limited entry has been advocated strongly as an important but as yet unused management tool for U.S. fisheries. Japan has maintained a policy of limiting entry into its high seas fisheries since 1949 and thus has considerable experience of potential value to the use of this tool in U.S. fisheries. This paper presents an assessment of the limited entry system as it has been developed for the Japanese tuna fisheries. Attention is given to effects on the acquisition of capital and overall allocation of national resources, specific effects on the size and nature of the fleet, pressures to permit additional entry, and effects on the location of shore-based activities. Special attention is given to problems that were unforeseen at the time of the initiation of limited entry that, with experience, could have been avoided. The paper is based largely on field research conducted in 1963 and 1964.

[3 figures, 8 references] Author's abstract

9.3 MANAGING OUR COASTAL ZONE

(Authors and titles listed below)
Proceedings of a Conference on Coastal Zone Management, Feb. 20-21, 1973. Sponsored by the New York State Sea Grant Program, Albany, N.Y., 78 pp. Price not given.

This report is divided into three parts. The first part contains the addresses, the second part summarizes the results of the workshop sessions, and the third part is a list of participants. The addresses were:

"The Keynote Address," by Perry B. Duryea (New York State Assembly), pp. 3-5.
"The Coastal Zone - Semantics and Definitions," by Donald F. Squires (New York State Sea Grant Program), pp. 7-11.
"Coastal Zone Legislation in the States," by Marc J. Hershman (Coastal Resources Law, Sea Grant Legal Program, Louisiana State University), pp. 13-19.
"Policy Alternatives for Coastal Zone Management," by Richard R. Gardner (Office of Coastal Zone Management, NOAA, U.S. Dept. of Commerce), pp. 21-24.

The workshops dealt with two major areas: (1) Critical issues for the coastal zone and (2) Implementation of coastal zone planning and management. FTP

9.2 (1.0115) (1.5)(1.120) CROSS SECTION PRODUCTION FUNCTIONS FOR NORTH ATLANTIC GROUNDFISH AND TROPICAL TUNA SEINE FISHERIES

Carlson, Ernest W. (Economic Research Laboratory, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Washington, D.C.)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 42-56.

This paper explores the use of cross section production functions to estimate the fishing power of individual vessels. The problems addressed are: The proper measurement of output, the measurement of technological change, and the effect of location, crew size and important vessel characteristics.

Regression analysis upon data from the North Atlantic groundfish fishery and the tropical tuna seine fishery yielded highly significant results. Many of the hypothesized relationships are measurable and stable with relatively small errors. The tests indicate that: there are better measures of output than total pounds; fishing time is measured better using days absent rather than days fishing; the use of more vessel characteristics improves explanatory power; crew size can be an important variable; the effects of location can be measured; and technological change can be measured.

The production functions measured can then be used as inputs in devising management schemes.
[3 tables, 7 references, 4 appendixes] Author's abstract

9.2 PRODUCTION FROM THE SEA

Bell, Frederick W. (Economic Research Division, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Washington, DC 20235), Ernest W. Carlson, and Frederick V. Waugh
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 72-91.

The sea constitutes a common property resource which causes factor productivity to be heavily influenced by technological externalities. The sea is also subject to the spectre of Malthusian scarcity since man cannot manipulate the ocean environment (Barnett and Morse, 1963). We estimated the parameters using ordinary least squares of the dynamic Schaefer production model of the intervention of man into the oceanic ecosystem. A second production model for the sea to specify diminishing returns to capital and labor for any fixed biomass was developed. The parameters of the latter model were estimated by a computer search technique. The results indicate that the industry production function for marine life is subject to diminishing physical returns to capital and labor. For the cases considered in this study it also appears that the parabolic yield function developed by Schaefer, assuming constant returns to factors inputs, is not as realistic as a production function with diminishing returns to inputs with a given biomass.
[9 figures, 5 tables, 14 references, appendix] Authors' abstract

9.3 (9.2) THE ECONOMIC ZONE IN THE LAW OF THE SEA: SURVEY, ANALYSIS AND APPRAISAL OF CURRENT TRENDS

Johnston, Douglas M., and Edgar Gold
Occasional Paper No. 17, Law of the Sea Institute, University of Rhode Island, Kingston, RI 02881 (June 1973), 53 pp.

The economic zone proposal is a plan to establish an extensive maritime zone beyond the 12-mile territorial limits within which the coastal state would exercise national jurisdiction (either exclusive or preferential rights and sole or special responsibility) with respect to the resources and related activities within the zone. In practice, it appears that the economic zone proposals are an effort by developing countries to establish a high degree of control over the offshore resources under a single, multipurpose regime. In theory, economic zone proposals may represent an attempt to find an acceptable compromise between extensive territorial claims and extensive functionalist counterclaims to maritime jurisdiction. The economic zone concept thus appears to be quasi-territorial and quasi-functionalist.

Part one of this paper is a discussion of the claims to the economic zone and considers the definition of the economic zone, the evolution of the concept of the economic zone, and the characteristics of the claims to the economic zone. Part two is a discussion of the claim and counterclaim process and deals with the classification of the claimants and counterclaimants, the trends in the interaction of claims and counterclaims, and dynamics of the third United Nations Law of the Sea Conference diplomacy. Part three is a projection appraisal of the outcome of the trends of the Conference.
[49 footnotes] FTP

9.2 THE BUDGET'S NEW CLOTHES -- A CRITIQUE OF PLANNING-PROGRAMMING-BUDGETING AND BENEFIT-COST ANALYSIS

Merewitz, Leonard, and Stephen H. Sosnick
Markham Publishing Co. (3322 W. Peterson Ave.), Chicago, IL 60659 (1971), 318 pp. Price $10.95 ($5.95 paper [cover])
George E. Lamp, Jr. (reviewer)
Engineering Economist 18, No. 2, 137-138 (1973)

Although the Federal government no longer requires all elements of PPB (Planning, Programming, and Budgeting) in the decision making process, the reviewer believes this book should still be of value and interest to all who are concerned with government or other organization expenditure decisions and in PPB as a budgeting process, particularly because the book discusses both the positive and negative sides of PPB. Furthermore, the authors suggest that some attention be given to the negative aspects of PPB before expensive decisions to proceed are made.

The book contains 12 chapters covering the following subject areas: Historical review of PPB; Program accounting; Multi-year costing; Description and measurement of activities; Zero-based budgeting; Quantitative evaluation of alternatives; Time, interest, and uncertainty with regard to capital expenditures; "Efficiency benefit"; Objectives of the government; Project outlays, opportunity costs, associated costs, social costs, and alternative costs; History of benefit-cost analysis of two large government projects; and Summary and conclusions. The book is amply referenced. Some knowledge of economic concepts is essential. FTP

9.6 FISHERY PUBLICATIONS, CALENDAR YEAR 1968: LISTS AND INDEXES

Engett, Mary Ellen, and Lee C. Thorson (Scientific Publications Staff, National Marine Fisheries Service, Seattle, WA 98105)
NOAA Technical Report NMFS CIRC-380, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98105 (May 1973), iv + 24 pp.

The following series of fishery publications of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration (until October 1970 the Bureau of Commercial Fisheries of the U.S. Fish and Wildlife Service) in calendar year 1968 are listed numerically (with abstracts) and indexed by author, subject, and geographic area: Circular, Data Report, Fishery Industrial Research, Fishery Leaflet, and Special Scientific Report--Fisheries.
[1 figure]
Authors' abstract

9.6 FOOD SANITATION
(2.01)(2.05)

Guthrie, Rufus K. (in collaboration with Frank D. Borsenik, Glenn V. Brauner, and W. J. Harper)
Avi Publishing Co., Inc., Westport, Conn. (1972), 247 pp. Price not given.

This book covers the field of food sanitation and emphasizes applied microbiology as the foundation for good practices. Four chapters are given to an explanation of sanitary science and its relation to microorganisms and food. The concept of sanitation is expanded to cover undesirable chemicals and food in another chapter. Sanitation is applied, in individual chapters, to the use of water in the food industry, food processing, dairy food plants, food canning plants, and food preparation and service. The appendix contains a tabulation of common infectious diseases--food borne and air borne. Another section contains selected representative laws and codes regulating food industries. In addition, federal, state, county, and city health codes (recognized and recommended) are included. The book also contains bibliographies for each chapter, an index, and a glossary of terms.
SW

9.6 FISHERY PUBLICATIONS, CALENDAR YEAR 1969: LISTS AND INDEXES

Thorson, Lee C., and Mary Ellen Engett (Scientific Publications Staff, National Marine Fisheries Service, Seattle, WA 98105)
NOAA Technical Report NMFS CIRC-379, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98105 (Apr. 1973), iii + 31 pp.

The following series of fishery publications of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration (until October 1970 the Bureau of Commercial Fisheries of the U.S. Fish and Wildlife Service) in calendar year 1969 are listed numerically (with abstracts) and indexed by author, subject, and geographic area: Circular, Data Report, Fishery Industrial Research, Fishery Leaflet, and Special Scientific Report--Fisheries.
[1 figure]
Authors' abstract

9.7 DIRECTORY OF MARINE SCIENCE EDUCATION 1973

Schweitzer, James P. (Dept. of Marine Sciences, Louisiana State University) (compiler)
Center for Wetland Resources, Louisiana State University, Baton Rouge, LA 70803 (May 1973), 46 pp. Price $2.00.

The number of marine science programs in high schools, middle, and elementary schools probably exceeds 1,000, with an annual rate of increase of about 20%. This directory provides a national listing of marine science teachers in precollege education. With this directory, teachers can become apprised of others having an interest in this field, and thus they can correspond with them to share ideas, experiences, and teaching materials. The directory is divided into two parts; part I lists marine science teachers and part II lists other marine science education specialists coordinators, consultants, and those persons who could be of help to schools in establishing a marine science education program. The directory also contains some information on the nature of the individual marine science programs.
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Goatcher, W. D.	23	9.19
Graham, Linda B.	25	9.19
Griffiths, Nerys M.	1	0.39
Gur'yanova, E. M.	22	9.19
Guthrie, Rufus K.	29	9.6
Hamon, P. Y.	8	1.4
Hansen, N. Glem	5	0.7
Haque, R.	1	0.35
Hartman, W. L.	21	9.17
Heiligenberg, Walter	1	0.4
Hobson-Frohock, A.	1	0.39
Hogan, James W.	1	0.38
Holman, Ralph T. (ed.)	2	0.31
Howell, H. D.	11	6.130
Hurley, Donal A.	8	1.9
Igarashi, Kiyoko	9	4.11
Ivanova, A. P.	20	9.15
Jannasch, Holger W.	3	0.5
Jenkins, S. H. (ed.)	6	0.8
Jernelov, Arne	26	9.19
Johanson, Edward E.	21	9.19
Johnson, Ruth E.	11	4.9
Johnston, Douglas M.	28	9.3
Jørgensen, G.	5	0.7
Kaneda, Takashi	10	4.5
Kanuk, M. J.	9	4.6
Kaunitz, Hans	11	4.9
Keen, E. A.	27	9.2
Kempe, Lloyd L.	19	9.15
Kesteven, G. L.	16	9.0
Kitaue, Kazua (pat.)	18	9.14
Kol'gaev, A. M. (pat.)	20	9.15
Knowles, Charles O.	1	0.38
Kondo, Takeshi	14	7.463
Kumada, Kazumi (pat.)	18	9.14
Kuroki, Katsunobu (pat.)	18	9.14
Kvalvag, J.	23	9.19
La Motte, Clyde	5	0.8
Lamp, George E., Jr. (rev.)	28	9.2
Land, D. G.	1	0.39
LaRoche, Gilles	22	9.19
Lerke, Peter	3	0.5
Lewis, D. H.	4	0.5
Lincer, Jeffrey L.	24	9.19
Lipstein, Bianka	5	0.9
Lubet, Pierre	15	9.0
Lunde, Gulbrand	11	6.1
Machidori, Seiji	18	9.12
Martin, Dean F. (ed.)	2	0.4
Mattox, Bruce W.	26	9.2
Maugh, Thomas H., II	22	9.19
McLarney, William O.	19	9.16
Merewitz, Leonard	28	9.2
Metz, William D.	5	0.8
Meyer, Fred P.	19	9.15
Meyer, V.	4	0.6
Miyazaki, S.	23	9.19
Monselise, J. J.	14	7.461
Newman, W. A.	16	9.1
Nisbett, Alec	17	9.12
Norvell, M. J.	23	9.19
O'Hara, James	13	8.42
Ohfuji, Takehiko	10	4.5
Olson, Robert E.	20	9.15
Otto, Barbara	10	4.13
Padilla, George M. (ed.)	2	0.4
Parfianowicz, Halina	10	4.13
Parker, R. O., Jr.	18	9.12
Payne, Elizabeth	9	2.8
Peakall, David B.	24	9.19
Pesenson, I. B.	6	0.8
Podeszewski, Zbigniew	10	4.13
--	10	4.13
Pollard, J. F.	20	9.16
Pontecorvo, Giulio	26	9.2
Porkhal, E. V.	22	9.19
Pratt, Dan E.	10	2.8
Pratt, Ivan	20	9.15
Pristas, Paul J.	17	9.12
Rakaj, Ndoc.	24	9.19
Randall, S. E.	1	0.35
Ray, S.	24	9.19
Reber, Elwood F.	10	2.8
Regier, H. A.	21	9.17
Rich, Jack	27	9.2
Riley, J. P.	24	9.19
Robinson, Jordan A.	19	9.15
Ryder, John H.	19	9.16
Savel'yeva, E. A.	21	9.16
Schiller, Elizabeth Ann	10	2.8
Schweitzer, James P. (comp.)	29	9.7
Sedik, M. F.	9	3.5
Segura, Edilberto L.	27	9.2
Sergeant, D. E.	13	8.42
Shang, Yung Cheng	20	9.16
Sherma, Joseph (ed.)	13	7.0
Shifrin, S. M.	6	0.8
--	22	9.19
Shigeno, Kunihiko (pat.)	18	9.14
Shindo, Shigeaki	7	1.0158
Shuvatova, T. F.	21	9.16
Siegel, B. Z.	24	9.19
Siegel, S. M.	24	9.19
Sims, R. J.	9	4.6
Sison, E. C.	9	2.8
Sosnick, Stephen H.	28	9.2
Stenersen, J.	23	9.19
Stevens, Joe B.	26	9.2
Stodolnik, Ludmila	10	4.13
Sutcliffe, W. H., Jr.	17	9.12
Tarver, Johnnie W.	19	9.16
Thompson, Russell G.	25	9.2
Thomson, R. T.	7	2.1474
Thorarinsson, F.	24	9.19
Thorson, Lee C.	29	9.6
--	29	9.6
Thorsteinson, A. J.	23	9.19
Tingley, J. J.	1	0.35
Van der Merwe, Roelof P.	11	6.199
Veen, W. A. G.	12	4.82
Ward, James V.	15	8.42
Waugh, Frederick V.	28	9.2
Webb, B. F.	7	2.1477
Wedemeyer, Gary A.	23	9.19
Wessels, J. P. H.	12	6.139
Wessels, Jacobus P. H.	11	6.199
Whitaker, Donald R.	25	9.2
Williams, R. D.	23	9.19
Willis, Thurman D.	17	9.12
Wirsen, Carl O.	3	0.5
Witas, Tadeusz	12	6.14
Wolf, Thomas (rev.)	13	7.0
Wolken, Lawrence C.	25	9.2
Wurster, Charles F.	25	9.19
Yasuda, Kunio	18	9.12
Yeaple, Donald S.	21	9.19
Zabbarov, A. N.	6	0.8
Zweig, Gunter (ed.)	13	7.0

GPO 988-825

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